

**CONTRACT DOCUMENTS  
FOR**

---

**PLUMMER COMMUNITY WASTEWATER  
SYSTEM IMPROVEMENTS**

**IHS Project No. PO-16-M22**

**Coeur d'Alene Tribe Project No. 2016-08**

**Prepared for:**

**Indian Health Service**

And

**Coeur d'Alene Tribe, Public Works Department**

**Prepared by:**



1110 W. Park Place, #303  
Coeur d'Alene, ID 83814  
Phone: 208.758.0620

**March 2019**

**Project # 30503.005.01**

**SPECIFICATION STAMP PAGE**

DATE:	March 22, 2019	PROJECT:	Plummer Community Wastewater System Improvements
CLIENT:	Indian Health Service CDR Steve Sauer, P.E. District Engineer 528 E Spokane Falls Blvd, Ste 302 Spokane, WA 99202	IHS PROJECT NO:	PO-16-M22
		CDA TRIBE PROJECT NO:	2016-08
		CWEC PROJECT NO:	30503.005.01
		ENGINEER:	Daniel G. Remmick, P.E.

<u>Section</u>	<u>Specification Description</u>	<u>Section</u>	<u>Specification Description</u>
003132	Geotechnical Data	311100	Clearing and Grubbing
012700	Price and Payment	312210	Site Grading
013100	Project Management and Coordination	312310	Excavation, Trenching, & Backfill
013300	Submittal Procedures	312410	Embankment and Engineered Fill
013305	Material Submittal Review Form	312500	Erosion and Sediment Control
014200	References	323113	Chain Link Fences and Gates
014300	Quality Control/Quality Assurance	329020	Seed, Fertilize and Mulch
017200	Staking and Construction Surveying	330131	Temporary Sewer Bypass
017700	Closeout Procedures	330561	Sanitary Sewer Manholes
017800	Closeout Submittals	330563	Flow Control Vault
017805	Operation and Maintenance Manuals	333113	Sanitary Sewer
033000	Cast-in-Place Concrete	333125	Wastewater Force Main Piping
310515	Basic Site Soils and Aggregates	333213	Packaged Wastewater Lift Station
		333810	Basin Liner

The technical specification sections listed above have been prepared under the direction of the Professional Engineer, registered in the State of Idaho, whose seal and signature appear below:



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**PART 1**

**CALL FOR BIDS**

## Call for Bids

Sealed bids will be received by the Coeur d'Alene Tribe's Public Works Department, Attn: Jim Kackman, P.O. Box 408, Plummer, ID 83851, until 10:00 AM on \_\_\_\_\_, \_\_\_\_\_, 2019 for the following:

Project: Plummer Community Wastewater System Improvements

Project No.: IHS Project PO-16-M22; CDA Tribe Project 2016-08

Sealed bids will be opened promptly after the deadline.

This project consists of:

- Approximately 1,300 cubic yards of on-site excavation and embankment, and 5,700 cubic yards of import fill to construct a wastewater equalization basin.
- Approximately 5,980 square yards of 60-mil HDPE geomembrane liner and non-woven geotextile.
- Installation of a packaged wastewater lift station.
- Installation of a flow control vault with a Discharge Flow Regulator.
- Approximately 195 feet of 12-inch gravity sewer main
- Approximately 15 feet of 10-inch gravity sewer main
- Approximately 435 feet of 8-inch gravity sewer main.
- Approximately 121 feet of 4-inch sewer force main
- Approximately 535 feet of 8-inch underdrain piping
- Approximately 530 feet of 4-inch underdrain piping.
- Modification to an existing drop manhole.
- Installation of electrical improvements for the lift station.
- Partial removal and re-installation of chain link fence with gate around existing facilities.
- Related work as detailed in the contract drawings and specifications.

Contract documents, specifications, and plans are available by contacting the Coeur d'Alene Tribe's Public Works Department at (208) 686-2001.

A certified check, bid bond, or cashier's check in an amount not less than ten percent (10%) of the total bid must accompany the proposal.

The Tribe reserves the right to reject any and all bids, to waive technicalities or irregularities, and after careful consideration of all bids and factors involved, make the award to best serve the interests of the Coeur d'Alene Tribe. Indian Preference will apply as per the Tribal Employment Rights Ordinance (TERO).

Jim Kackman  
Public Works Director

**PART 2**

**BID PACKAGE**

## **BID PROPOSAL**

TO:           Coeur d'Alene Tribe  
              Public Works Department  
              P.O. Box 408  
              Plummer, ID 83851

ATTN:                 Jim Kackman, Public Works Director

The undersigned, as bidder, declare that we have examined all of the contract documents and that we will contract with the Coeur d'Alene Tribe on the form of contract provided to do everything necessary to complete the construction described as follows:

Project:                 Plummer Community Wastewater System Improvements

Project No.:            IHS Project PO-16-M22; CDA Tribe Project 2016-08

We agree that the bid bond shall form a part of this proposal (If contract exceeds \$50,000).

Attached is a bid bond duly completed by a guaranty company authorized to carry on business in the State of Idaho in the amount of at least ten percent (10%) of the total amount of our proposal, or alternatively, there is attached a certified or cashier's check payable to the Coeur d'Alene Tribe in the amount of at least ten percent (10%) of the total amount of proposal.

If our proposal is accepted, we agree to sign the contract form provided by the Tribe and to furnish the required contract bonds and evidences of insurance within fifteen (15) calendar days after receiving written notice of the award of contract.

We further agree, if our proposal is accepted and a contract for performance of work is entered into with the Coeur d'Alene Tribe, to so plan the work and to prosecute it with such diligence that all of the work shall be completed within sixty (60) calendar days from the contractor's receipt of a Notice to Proceed. We understand that the Coeur d'Alene Tribe reserves the right to reject any or all bids and to determine which proposal is, in the judgment of the Tribe, the lowest responsible bid of a bidder or group of bidders and which proposal, if any, should be accepted in the best interests of the Tribe, and that the Tribe also reserves the right to waive any informalities in any proposal or bid.

We further state that we have not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract.

We propose to perform the work for the following prices bid:

**Bid Proposal: IHS Project PO-16-M22; CDA Tribe Project 2016-08  
Plummer Community Wastewater System Improvements**

<b>ITEM NO.</b>	<b>DESCRIPTION</b>	<b>ESTIMATED QUANTITY</b>		<b>UNIT PRICE</b>	<b>TOTAL AMOUNT</b>
1	Mobilization	1	LS	\$	\$
2	Temporary Erosion & Sediment Control	1	LS	\$	\$
3	Embankment	1,300	CY	\$	\$
4	Engineered Fill	5,700	CY	\$	\$
5	Crushed Aggregate Type 1	275	TN	\$	\$
6	Drain Rock	1,400	TN	\$	\$
7	Flow Control Vault	1	LS	\$	\$
8	Manhole	2	EA	\$	\$
9	Drop Manhole Modification	1	LS	\$	\$
10	Excavation, Trench and Backfill	766	LF	\$	\$
11	PVC Sanitary Sewer Pipe 12 In. Diam	195	LF	\$	\$
12	PVC Sanitary Sewer Pipe 10 In. Diam	15	LF	\$	\$
13	PVC Sanitary Sewer Pipe 8 In. Diam	435	LF	\$	\$
14	PVC Force Main, 4 In. Diam	121	LF	\$	\$
15	Perforated Drain Pipe 8 In. Diam	535	LF	\$	\$
16	Perforated Drain Pipe 4 In. Diam	530	LF	\$	\$
17	Temporary Sewer Bypass	1	LS	\$	\$
18	Packaged Wastewater Lift Station	1	LS	\$	\$
19	60-Mil HDPE Liner	5,980	SY	\$	\$

20	Geotextile for Separation - 6oz Non-woven	5,980	SY	\$	\$
21	Chain Link Fence, Remove and Replace	100	LF	\$	\$
22	Hydroseed	3,400	SY	\$	\$
23	General Electrical	1	LS	\$	\$
				<b>SUBTOTAL</b>	\$
	2%TERO Fee				\$
				<b>TOTAL</b>	\$

**BID PROPOSAL SIGNATURE SHEET**

Project: Plummer Community Wastewater System Improvements

Project No.: IHS Project PO-16-M22; CDA Tribe Project 2016-08

BIDDER \_\_\_\_\_

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ COUNTY: \_\_\_\_\_ STATE: \_\_\_\_\_

ZIP CODE \_\_\_\_\_

TELEPHONE NO.: (\_\_\_\_) \_\_\_\_\_ FAX NO.: (\_\_\_\_) \_\_\_\_\_

TAX IDENTIFICATION NO. \_\_\_\_\_

IDAHO STATE/TERO CONTRACTOR'S LICENSE NO. \_\_\_\_\_

EXPIRES: \_\_\_\_\_

BIDDER IS A: (CHECK ONE)

\_\_\_\_\_ CORPORATION

\_\_\_\_\_ PARTNERSHIP

\_\_\_\_\_ INDIVIDUAL DOING BUSINESS AS \_\_\_\_\_

Bidder(s) affirms that they have not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract.

BID SUBMITTED FOR BIDDER BY:

\_\_\_\_\_  
Signature Title Date

NOTE:

- (1) If the bidder is a co-partnership, so state, giving firm name under which business is transacted.
- (2) If bidder is corporation, this proposal must be executed by its duly authorized officers.
- (3) Documents required at bid time:
  - (a) Signed Line Item Bid Proposal
  - (b) Qualification of Bidder form
  - (c) Subcontractor List

**QUALIFICATION OF BIDDER**

Project: Plummer Community Wastewater System Improvements

Project No.: IHS Project PO-16-M22; CDA Tribe Project 2016-08

If the above contract is awarded to our company, the following persons will be authorized to sign change orders, progress payments and similar documents for the company: (names and positions)

\_\_\_\_\_

The Contractor's superintendent at the job site will be (give full name)

\_\_\_\_\_

The last three projects completed or substantially completed by our company involving similar construction work are as follows:

1. Project Name: \_\_\_\_\_  
Dollar amount of Contract: \_\_\_\_\_ \$  
Owner: \_\_\_\_\_  
Owner's Representative \_\_\_\_\_ Phone \_\_\_\_\_  
Contractor's Superintendent on this project \_\_\_\_\_  
Brief Description of Project Scope: \_\_\_\_\_  
\_\_\_\_\_

2. Project Name: \_\_\_\_\_  
Dollar amount of Contract: \_\_\_\_\_ \$  
Owner: \_\_\_\_\_  
Owner's Representative \_\_\_\_\_ Phone \_\_\_\_\_  
Contractor's Superintendent on this project \_\_\_\_\_  
Brief Description of Project Scope: \_\_\_\_\_  
\_\_\_\_\_

3. Project Name: \_\_\_\_\_  
Dollar amount of Contract: \_\_\_\_\_ \$  
Owner: \_\_\_\_\_  
Owner's Representative \_\_\_\_\_ Phone \_\_\_\_\_  
Contractor's Superintendent on this project \_\_\_\_\_  
Brief Description of Project Scope: \_\_\_\_\_  
\_\_\_\_\_

Company \_\_\_\_\_

Title of Person completing this form \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_ Phone \_\_\_\_\_



**INSURANCE COVERAGE QUESTIONNAIRE**

FOR: \_\_\_\_\_  
 (Name of Insured)

Project: Plummer Community Wastewater System Improvements

Project No.: IHS Project PO-16-M22; CDA Tribe Project 2016-08

Project Owner: Coeur d'Alene Tribe

<b>Are the following coverage or conditions in effect?</b>	<b>Yes</b>	<b>No</b>
The policy is written on ISO Commercial General Liability form CG 00 01 and provides coverage of liability arising from premises, operations, independent contractors, personal injury and advertising injury, and liability assumed under an insured contract.		
Products completed operations coverage		
Stop gap liability or equivalent coverage (Only required for State of WA Contractors)		
Endorsed to provide the Aggregate Per Project Endorsement ISO form CG 25 03 11 85		
X, C, U hazards included		
Tribe named as an additional insured using ISO Additional Insured Endorsement CG 20 10 10 01 or equivalent		
30 days written notice of cancellation to the Tribe		

Deductibles: GL \$ \_\_\_\_\_ AL \$ \_\_\_\_\_ Excess \$ \_\_\_\_\_

Insurers' Best Rating(s): GL \$ \_\_\_\_\_ AL \$ \_\_\_\_\_ Excess \$ \_\_\_\_\_

\*Excess only applicable on contracts in excess of \$500,000

This Questionnaire is issued as a matter of information. This Questionnaire is not an insurance policy and does not amend, extend, or alter the coverage afforded by the policies indicated on the attached Certificate of Insurance.

\_\_\_\_\_  
 Agency or Brokerage

\_\_\_\_\_  
 Completed by (type or print)

\_\_\_\_\_  
 Address

\_\_\_\_\_  
 Completed by (signature)

\_\_\_\_\_  
 Name of Person to be Contacted

\_\_\_\_\_  
 Telephone Number

**BID BOND FORM (If project exceeds \$50,000)**

Herewith find deposit in the form of a certified check, cashier's check, cash, or bid bond in the amount of \$ \_\_\_\_\_ which amount is not less than ten percent of the total bid.

Sign Here: \_\_\_\_\_

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS:

That we, \_\_\_\_\_, as Principal, and \_\_\_\_\_, as Surety, are held and firmly bound unto the Coeur d'Alene Tribe, as Obligee, in the penal sum of \_\_\_\_\_, dollars, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

The condition of this obligation is such that if the Obligee shall make any award to the Principal for Project No. **2016-08/PO-16-M22** Title "**Plummer Community Wastewater System Improvements**" according to the terms of the proposal or bid made by the Principal therefor, and the Principal shall duly make and enter into a contract with the Obligee in accordance with the terms of said proposal or bid and award and shall give bond for the faithful performance thereof, with Surety or Sureties approved by the Obligee; or if the Principal shall, in case of failure so to do, pay the forfeit to the Obligee the penal amount of the deposit specified in the call for bids, then this obligation shall be null and void; otherwise it shall be and remain in full force and effect and the Surety shall forthwith pay and forfeit to the Obligee, as penalty and liquidated damages, the amount of this bond.

SIGNED, SEALED AND DATED THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
Principal

\_\_\_\_\_  
Surety

\_\_\_\_\_  
Received return of deposit in the sum of \$ \_\_\_\_\_, 20\_\_\_\_\_

Signed: \_\_\_\_\_

# **PART 3**

## **SAMPLE CONTRACT FORMS**

**BID PERFORMANCE AND PAYMENT BOND  
BOND TO COEUR D'ALENE TRIBE**

(Note: This form will be required from the contractor who is awarded the contract)

KNOW ALL MEN BY THESE PRESENTS:

That we, the undersigned, \_\_\_\_\_  
as principal, and \_\_\_\_\_, a corporation organized and  
existing under the laws of the State of \_\_\_\_\_, as a surety corporation, and  
qualified under the laws of the State of Idaho to become surety upon bonds of contractors with  
municipal corporations and tribal organizations, as surety, are jointly and severally held and firmly  
bound to the Coeur d'Alene Tribe in the penal sum of \$ \_\_\_\_\_ for the payment of which  
sum on demand we bind ourselves and our successors, heirs, administrators or personal  
representatives, as the case may be.

This obligation is entered into in pursuance of the statutes of the State of Idaho, and the  
regulations and policies of the Coeur d'Alene Tribe.

Dated at \_\_\_\_\_, Idaho, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

Nevertheless, the conditions of the above obligation are such that:

WHEREAS, the Coeur d'Alene Tribe has let or is about to let to the said contractor  
\_\_\_\_\_, the above bonded Principal, a certain contract, the said contract  
being numbered \_\_\_\_\_, and providing for project name:  
\_\_\_\_\_, which contract is referred to herein and is made a part  
hereof as though attached hereto, and

WHEREAS, the said Principal has accepted, or is about to accept, the said contract, and  
undertake to perform the work therein provided for in the manner and within the time set forth;

NOW, THEREFORE, if the said contractor shall faithfully perform all of the provisions of  
said contract in the manner and within the time therein set forth, or within such extensions of time  
as may be granted under said contract, and shall pay all laborers, mechanics, subcontractors and  
material men, and all persons who shall supply said principal or subcontractors with provisions  
and supplies for the carrying on of said work, and shall in all respects faithfully perform said  
contract according to law then this obligation shall be void, but otherwise it will remain in full force  
and effect.

\_\_\_\_\_  
Contractor

By: \_\_\_\_\_  
Agent for Surety

By: \_\_\_\_\_

Mailing Address of Agent for Surety:

Title: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## COEUR D'ALENE TRIBE

### Contract for Services Related to: "Plummer Community Wastewater System Improvements"

IHS Project No. PO-16-M22; CDA Tribe Project No. 2016-08

This ("Contract") is entered into between the Coeur d'Alene Tribe, P.O. Box 408, Plummer, ID, 83851, ("Tribe"), by and through its Coeur d'Alene Tribal Public Works Department, and \_\_\_\_\_ ("Contractor").

#### **TERMS:**

**Contractor agrees to perform such professional services as are set forth in this Contract, and the Tribe agrees to pay Contractor such amount as specified in this Contract, all contingent upon the following terms and conditions:**

#### **1.0 Scope of Services**

- Approximately 1,300 cubic yards of on-site excavation and embankment, and 5,700 cubic yards of import fill to construct a wastewater equalization basin.
- Approximately 5,980 square yards of 60-mil HDPE geomembrane liner and non-woven geotextile.
- Installation of a packaged wastewater lift station.
- Installation of a flow control vault with a Discharge Flow Regulator.
- Approximately 195 feet of 12-inch gravity sewer main
- Approximately 15 feet of 10-inch gravity sewer main
- Approximately 435 feet of 8-inch gravity sewer main.
- Approximately 121 feet of 4-inch sewer force main
- Approximately 535 feet of 8-inch underdrain piping
- Approximately 530 feet of 4-inch underdrain piping.
- Modification to an existing drop manhole.
- Installation of electrical improvements for the lift station.
- Partial removal and re-installation of chain link fence with gate around existing facilities.
- Related work as detailed in the contract drawings and specifications.

## **2.0 Deliverables**

Contractor shall perform the scope of services described in this Contract and as shown on the construction plans for this project dated \_\_\_\_\_ (Exhibit "A"), and also in accordance with the construction specifications dated \_\_\_\_\_ (Exhibit "B"), and further set forth in Contractor's bid received \_\_\_\_\_, (Exhibit "C") attached to this Contract.

## **3.0 Term**

- 3.1 This Contract shall commence upon its signing by the authorized representatives of both parties beginning \_\_\_\_\_ and shall terminate by \_\_\_\_\_. This is the project completion date. The term may be extended upon the signed agreement of the parties. The Tribe is under no obligation to extend the completion date, but may do so if in the opinion of the Public Works Director an extension is warranted. Either party may terminate this agreement by giving the other party 10 days written notice.
- 3.2 If the project is not completed by the project completion date referenced in 3.1 above, the Tribe may assess a non-performance penalty of \$500 per day until the contractor and the Public Works Director agree that the project is fully complete and all of the terms of the contract have been complied with.

## **4.0 Payment**

- 4.1 The total amount to be paid under this Contract, contingent upon the Coeur d'Alene Tribe's acceptance of the Contractor's work, is \$\_\_\_\_\_.
- 4.2 Anticipated payment schedule shall be monthly based on percent complete as agreed upon by both parties. The Tribe will withhold five (5) percent retainage on all partial progress payments until the final payment is made. The Contractor shall calculate retainage and exclude retainage from monthly invoices.
- 4.3 Funds for performance of this contract shall be allocated from the Coeur d'Alene Tribe Fund No. \_\_\_\_\_.

## **5.0 Administrative Provisions**

- 5.1 Contractor shall comply with the Copeland "Anti-kickback" Act.
- 5.2 Contractor shall comply with the Davis-Bacon Act regarding wage rates. Copies of certified payroll shall be provided to the Tribe on a weekly basis.
- 5.3 Contractor shall comply with the "Equal Employment Opportunity" Executive Order 11246 and also with the Tribe's TERO Ordinance provisions and Indian preference hiring requirements.

- 5.4 Compliance with Sections 103 and 107 of the Contract Work Hours and Safety Standard Act.
- 5.5 Contractor shall comply with IHS requirements for reporting, as called for in the Memorandum of Agreement (MOA).
- 5.6 The Prime Contractor shall perform with its own employees and equipment at least 33.3 percent of the total amount of work included in the contract.
- 5.7 Contractor shall comply with all applicable environmental laws and EPA regulations including Executive Order 11738. (Contracts exceeding \$100,000.)

## **6.0 Insurance**

- 6.1 The Contractor is required to keep in force at Contractor's expense general liability, motor vehicle, worker's compensation insurance, and professional liability insurance during the work period of this contract as well as the warranty period. Motor vehicle coverage shall be no less than one million dollars combined single limit and aggregate for bodily injury and property damage. Contractor shall provide comprehensive commercial general liability coverage in an amount not less than one million dollars per occurrence and two million dollars in the aggregate, naming the Coeur d'Alene Tribe as an additional insured, and which does not exclude the type of work performed by Contractor under this Contract. Obtaining appropriate endorsement for this particular project to any umbrella policy of liability insurance Contractor maintains may satisfy this requirement.
- 6.2 Contractor shall deliver a certificate of insurance to the Tribe prior to execution of this Contract, and Contractor shall deliver full policy documents in electronic form (pdf) to the Tribe within ten (10) working days of execution of this Contract.

## **7.0 Independent Contractor**

Both parties agree that Contractor will act as an independent contractor in the performance of its duties under this contract. Contractor shall be responsible for payment of all applicable taxes including federal, state and local taxes arising from its activities under this contract. The Tribe will provide a 1099 at the end of the calendar year. Contractor is also responsible for obtaining all necessary federal or local permits in order to perform such work.

## **8.0 Contractor's Use of the Premises**

- 8.1 Confine operations at the site to areas permitted by laws, ordinances, permits, contract documents, and the Tribe's requirements.
- 8.2 Do not unreasonably encumber job site with materials or equipment. Use specified areas for storage and equipment.
- 8.3 Assume full responsibility for protection and safekeeping of products stored on premises. Protect materials against dispersion by wind forces.

- 8.4 Move any stored products that interfere with operations of the Tribe.
- 8.5 Obtain and pay for use of additional storage or work areas needed for operations.
- 8.6 Maintain good housekeeping at all times around site and around the structure.

## **9.0 Use of Site**

Comply with the Tribe's requirements for access and egress procedures, identification of workers, and such other rules and procedures as the Tribe may establish from time to time for the safety and security of the entire property, job site, and the project.

## **10.0 Tribe's Right to Access for Observation**

- 10.1 The Tribe reserves the right of access to any part of the work, at any time, for the purpose of observation. The contractor shall cooperate with the Tribe during the Tribe's access for observation of the work.
- 10.2 The Tribe shall have the right to inspect the material and workmanship of all items concerned with this project and shall have free access at all times to inspect any part of the work. In addition, the owner may have full-time inspection.

## **11.0 Indemnification**

To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Tribe, the Tribal Public Works Department and their guests, agents, and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys fees arising out of or resulting from the performance of the Contractor's duties pursuant to this Contract, provided that any such claim, damage, loss or expense is caused in whole or in part by any negligent act or omission for which the Contractor may be liable, regardless of whether or not such act or omission is in part that of a party indemnified hereunder.

## **12.0 Assignment and delegation, subcontracting**

- 12.1 The Contractor may not assign the rights nor delegate the duties described under this Contract, nor subcontract any part of the work to be performed pursuant to this Contract without the Tribe's written approval. The Tribe may attach any reasonable conditions or limitations to the employment of any subcontractor.
- 12.2 The Contractor shall provide a list of all employees and subcontractors and subcontractor's employees that will be used during the construction of this project prior to commencement of work at the site.

### **13.0 Forum**

The forum for any dispute concerning this contract shall be the Coeur d'Alene Tribal Court. This contract shall be construed in accordance with the contract laws of the Coeur d'Alene Tribe as applicable. In the absence of such laws, the laws of the State of Idaho may be utilized as guidelines by the trier of fact.

### **14.0 Sovereign Immunity**

Nothing in this Contract shall be construed as a waiver or diminishment of the Coeur d'Alene Tribe's inherent sovereign immunity.

### **15.0 Warranties**

Contractor warrants that all Contractor and Contractor's employees and subcontractors will be properly certified to perform the work described herein, and that all laws, licenses and other requirements to perform said work will be complied with by Contractor. Contractor agrees to warrant remedy any activities/work without cost to the Tribe for a period of one (1) year.

### **16.0 Proprietary Rights and Confidentiality**

16.1 All material produced as a result of this contract is the property of the Tribe for the sole beneficial use of the Tribe. Material contained therein shall not be reproduced without written permission from the Tribe.

16.2 The Contractor may, in the process of performing his or her duties under the terms of this Contract, have access to records, material, research, products, services, inventions, processes, designs, drawings, engineering, marketing or finances which is designated in writing as having been disclosed as confidential or proprietary. Contractor warrants that he will not disclose any such information to anyone for any purpose without express written authorization by the Tribe.

### **17.0 Entire Agreement; Order of Precedence; Modification**

This Contract shall constitute the entire understanding between the parties with respect to the subject matter herein. In the case of any discrepancies or ambiguities which may occur between this Contract and any supporting documents, the terms of this Contract shall prevail. This Contract may not be amended except by an agreement signed by the authorized representatives of the Tribe and the Contractor.

IN WITNESS WHEREOF, the parties agree to the provisions set forth herein as evidenced by the signatures of their authorized representatives below:

COEUR D'ALENE TRIBE

\_\_\_\_\_  
Robert A. Matt, Administrative Director

\_\_\_\_\_  
Date

CONTRACTOR

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Date

# **PART 4**

## **COEUR D'ALENE TRIBAL CODE**

## CHAPTER 40: BUSINESS LICENSES

- 40-1.01 Sovereign Power to Regulate Business
- 40-1.02 Purpose
- 40-1.03 Definitions
- 40-1.04 Administration of Chapter
- 40-1.05 Administrative Actions
- 40-1.06 License and Fee Required
- 40-1.07 License Fee and Duration
- 40-1.08 Application and Issuance
- 40-1.09 Denial of License
- 40-1.10 Conditions of License
- 40-1.11 Revocation of License
- 40-1.12 Operating Business on Coeur d'Alene Reservation
- 40-2.01 Severability
- 40-3.01 Liability

## CHAPTER 40

### BUSINESS LICENSES

#### 40-1.01      Sovereign Power to Regulate Business

Subject to limitations imposed by federal law, the power to regulate business conducted within the Reservation is an inherent and essential part of the authority of tribal government. This chapter is enacted pursuant to the inherent sovereign tribal powers expressly delegated to the Tribal Council in the Tribal Constitution.

#### 40-1.02      Purpose

The Tribal Council finds that, subject to limitations imposed by federal law the regulation of trade and business on the Reservation is necessary to safeguard and promote the peace, safety, morals, and general welfare of the Tribe. Accordingly, the Tribal Council declares that the Tribe has the sole and exclusive authority to grant, deny, or withdraw the privilege of doing business within the Reservation to persons subject to the Tribe's jurisdiction.

#### 40-1.03      Definitions

1. **“Business”** means an occupation, profession, or activity engaged in with the object of gain, benefit or advantage, either directly or indirectly.
2. **“Tribe”** means the Coeur d'Alene Tribe.
3. **“Council”** means the Coeur d'Alene Tribal Council.
4. **“Reservation”** means the exterior boundaries of the Coeur d'Alene Reservation.
5. **“Director”** means the “Tribal Employment Rights Ordinance” (TERO) Director acting in his or her official capacity.
6. **“Person”** means any individual, firm, partnership, corporation, joint venture, association, estate, trust, business trust, receiver, syndicate, holding company, or other group or combination acting as a unit, in the singular or plural, and the agent or employee having charge or control of a business in the absence of the principals.
7. **“Licensee”** means any “person” who is granted a business license by the Tribe.

#### 40-1.04      Administration of Chapter

The TERO Office is hereby delegated the responsibility to administer the provisions of this chapter. The TERO Director is hereby delegated all powers which are specifically provided for in this chapter, or impliedly necessary to implement its

provisions, subject to Council review of any action taken by virtue of such delegated power.

**40-1.05**            **Administrative Actions**

The Director shall promulgate regulations pursuant to this Chapter, formulate recommendations to submit to the Council for revisions of or amendments to this Chapter, and take other actions necessary for the administration of the provisions of this Chapter.

**40-1.06**            **License and Fee Required**

Every person subject to the Tribe's jurisdiction who is engaged or intending to engage in any business, in whole or in part, within the exterior boundaries of the Coeur d'Alene Reservation, is required to pay an annual license fee and obtain a business license as herein provided.

**40-1.07**            **License Fee and Duration**

The application fee shall be \$100.00 and shall be submitted in cash, money order, or certified check with the application. The application fee may be increased by Council Resolution. Each license shall be issued for one year and must be renewed annually.

**40-1.08**            **Application and Issuance**

An application for a business license shall be submitted in writing to the TERO office, using forms which it shall provide. Any person engaged in business at the time this Chapter is enacted shall have 90 days in which to obtain and submit to the Tribe an application for a license. All applications shall include:

1. A description of the type of business;
2. The name and physical address of the owner or owners of the business;
3. The trade name, if any, to be used by the business;
4. The locations on the Reservation at which the business will be conducted;
5. The Tribal membership and enrollment number, if applicable, for the owner or owners of the business; and
6. The percentage of ownership of the business for each owner if there is more than one owner of the business.

The Director shall present a resolution to the Tribal Council with the application attached for final approval. Following Tribal Council action on the application, the Director shall notify the applicant by regular mail within 7 days after the Tribal Council decision whether a license shall be issued. If a license is issued, the licensee shall post the license in a conspicuous manner at its primary business location.

#### **40-1.09**      **Denial of License**

The Tribal Council may deny the applicants business license if it finds that:

1. the applicant has materially misrepresented facts contained in the application;
2. the applicant presently is in non-compliance with tribal law; or
3. the business will threaten the peace, safety, morals, or general welfare of the Tribe.

The Director shall notify the applicant in writing, by certified mail return receipt requested, within 7 days following the Tribal Council decision. The decision of the Tribal Council shall be final.

#### **40-1.10**      **Conditions of License**

Each licensee shall comply with all applicable tribal laws, including but not limited to: Indian employment and contracting preference laws, health and sanitation laws, environmental laws and consumer protections laws. Each licensee shall respond in a timely manner to requests by the TERO office for information about the licensee's business for the purpose of establishing whether the licensee is in compliance with the terms of this Chapter.

#### **40-1.11**      **Revocation of License**

Whenever it is brought to the attention of the Director that any person is in noncompliance with any condition of his or her license, the Director may revoke the licensee's license and serve upon such person a letter, by certified mail return receipt requested, notifying the licensee of the reasons for such revocation and shall state that the applicant has 10 days from receipt of the letter of revocation to file a notice of appeal with the TERO office for an appeal to the Tribal Council. The appeal shall be conducted in accordance with section 40-1.10 above.

#### **40-1.12**      **Operating Business on Coeur d'Alene Reservation**

The issuance of a business license under this Chapter shall only constitute a notice that the business is operating on the Coeur d'Alene Reservation and shall be of no other force or effect. Such business license shall not constitute a property interest. Such business license shall not constitute a Tribal ratification or approval of the business conduct or of products or services offered by the business.

**40-2.01      Severability**

If any provision of this Chapter or its application to any person or circumstances is held invalid, the remainder of this Chapter, or the application of the provision to other person or circumstances is not affected.

**40-3.01      Liability**

The Coeur d'Alene Tribe shall not be liable to any person or entity in any way as a result of any license issued under this Chapter or as a result of the action, or lack thereof, of any business licensed under this Chapter. The Coeur d'Alene Tribe does not waive its sovereign immunity by acting under this Chapter and expressly does not waive its sovereign immunity by issuing business licenses or temporary business permits.

## CHAPTER 41

### TRIBAL EMPLOYMENT RIGHTS

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Coeur d'Alene Tribal Code

Amended 05/12/2011 by Resolution 138(2011)

Amended 06/15/2006 by Resolution 165(2006)

Amended 07/27/2000 by Resolution 270(2000)

Amended 07/19/2005 by Resolution 236(2005)

Amended 09/28/2000 by Resolution 307(2000)

- 41-22.01 T.E.R.O. Compliance Officer
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## CHAPTER 41

### TRIBAL EMPLOYMENT RIGHTS

#### **41-1.01**      **Name**

This Chapter will be known as the “Tribal Employment Rights”, also commonly known as the “Tribal Employment Rights Ordinance” (T.E.R.O.).

#### **41-2.01**      **Purpose**

The purpose of this Chapter is to assist in and require fair employment of Indians on or near the Coeur d’Alene Reservation and to prevent discrimination against Indians in any employment practices by employers on or near the Reservation. The Tribal Employment Rights Board will govern and establish rules, regulations and policies. The Board’s responsibility and authority are to ensure on or near the Reservation compliance with this Chapter.

#### **41-3.01**      **Statement of Purpose**

As a guide to the interpretations and application of this Chapter, the public policy of the Coeur d’Alene Tribe is declared to be as follows:

Like land, water and minerals; jobs, contracts and subcontracts in the private sector on or near our Reservation are important resources for Indian people. Indians must protect their rights and obtain their share of workforce opportunity, as they become available. Indians have unique and special employment, subcontract and contract rights and the Coeur d’Alene Tribal government has the inherent sovereign power to pass laws to implement and enforce those special rights on behalf of Indian people. Indians are also entitled to the protection of the laws that the federal government has adopted to combat employment discrimination, and the Tribal government can and should play a role in the enforcement of those laws. The Coeur d’Alene Tribe believes it is important to establish an employment rights program and office in order to use the aforementioned laws and powers to increase employment of Indian workers and businesses and to eradicate discrimination against Indians.

#### **41-4.01**      **Consistent with Congressional Action**

Nothing contained in this Chapter will supersede or be inconsistent with Federal Law on Equal Employment Opportunity, namely;

(A) Federal Laws:

1. Title VII of the Civil Rights Act prohibits preferential employment on the basis of race, color, sex, national origin, and religion. However, Title VII contains a special exemption, which makes Indian Preference permissible.

Section 703 (i) of the 1964 Civil Rights Act states “[N]othing contained in this title will apply to any business or enterprise on or near an Indian Reservation with regard to any publicly announced employment practices of such business or enterprise under which a preferential treatment is given to any individual because he or she is Indian.”

2. The Office of Federal Contract Compliance Programs Executive Order 11246 issued in 1977 states: “Work on or near Indian Reservation. It shall not be a violation of the equal opportunity clause for construction or non-construction to extend publicly announced preference in employment to Indians living on or near an Indian reservation. The use of the word “near” would include all that area where a person seeking employment, could reasonably be expected to commute to and from in the course of a work day. Contractors or subcontractors extending such a preference will not, however, discriminate among Indians on the basis of religion, sex, or tribal affiliation, and the use of such preference will not excuse a contractor from complying with the other requirement contained in this chapter.”

(B) Congressional Endorsement:

The United States Congress justifies that the Indian tribe’s power to impose preferential requirements on the grounds that “[T] his exemption is consistent with the Federal Government’s policy of encouraging Indian employment and with the special legal position of Indians.”

**41-5.01**      **Definitions of Important Terms and Words**

- (A) Agent. An employee or individual authorized to act on behalf of the Board and this representative authorized by the Board to direct and enforce the T.E.R.O. The primary agent for the Board shall be the T.E.R.O. Manager.
- (B) Business for Profit. Shall mean any business, enterprise or operation, which is not considered a nonprofit or not-for-profit organization by the IRS.
- (C) Chairperson. Shall mean the Chairperson of the Coeur d’Alene Tribal Employment Rights Board
- (D) Board. Shall mean the Coeur d’Alene Tribal Employment Rights Board.
- (E) Board Member. Shall mean a Member of the Coeur d’Alene Tribal Employment Rights Board
- (F) Core Crew. Shall mean a member of a contractor’s or subcontractor’s crew who is a regular, permanent employee and is in a supervisory or other key position

such that the employer would face a serious financial loss or unacceptable risk if that position were filled by a person who had not previously worked for that contractor or subcontractor.

- (G) Council. Will mean the Tribal Council of the Coeur d'Alene Tribe.
- (H) Direct Federal Contracts. A direct federal contract is a contract let by a Federal agency directly to a general or prime contractor.
- (I) EEOC. Shall mean the Equal Employment Opportunity Commission of the United States.
- (J) Employer. Shall mean any person, company, contractor, subcontractor or other entity located or engaged in work on or near the Coeur d'Alene Reservation.
- (K) Engaged in Work On or Near the Reservation. An employer is "engaged in work on or near the Reservation" when an employer is engaging in construction work within boundaries of the Reservation, or when work is commenced or continued within commuting distance. Near the Reservation will be defined as within a 30-mile radius of existing Reservation boundary lines.
- (L) Entity. Means any person, partnership, corporation, joint venture, government, governmental enterprise, or other organizations. The term ENTITY is intended to be as broad and encompassing as possible to ensure the Chapter's coverage over all employment and contract activities within the Tribe's jurisdiction, and the term will be so interpreted by the Board, Tribal Council and the Tribal Court.
- (M) Federally Funded Contracts. A federally funded contract is one in which the Federal Government has contracted or granted funds to an entity which, in turn, awards the prime contract.
- (N) For the Benefit of Indians. Work to be performed under a Federal or Federally funded contract on and near the Coeur d'Alene Reservation can be the primary source of assistance for Tribal and community economic development by providing career development, training opportunities, and small business support. If and when it is determined as a "benefit for Indians", either by the Tribal government or Board the Manager will be authorized to enter into negotiations for Project Labor Agreements (PLA) with Federal, State, Tribal, and local agencies that will include but not be limited to review projects for:
  - 1. The utilization of Tribal resources.
  - 2. Contracting/subcontracting technical assistance from various programs within the Tribal organization.
  - 3. Effective utilization and protection of Tribal natural resources.
  - 4. Equipment or supplies.

5. The utilization of Indian preference contractors, subcontractors.
  6. The utilization of Indian preference building suppliers.
  7. The coordination and implementation of T.E.R.O.
  8. Negotiate Union Labor Agreements, if desired.
- (O) Indian. Shall mean any person that is an enrolled member of a Federally recognized tribe.
- (P) Indian Preference Contractor or Subcontractor. Contractor or subcontractor that is 51% or more Indian owned, controlled and managed is eligible for status as an Indian Preference Contractor. Preference guidelines will follow as stated in this Chapter with additional justification based on Reservation or community involvement. It will be under the discretion of the T.E.R.O. Chairperson or Manager to verify and validate all Indian Preference Contractors.
- (Q) Indian Owned Business. Shall mean a business entity of which at least 51% is actively owned, operated and managed by an Indian or Indians.
- (R) Indian Preference Applicant. Shall mean any person recognized as an enrolled member of a Federally recognized Tribe.
- (S) Local Indian or Local Indian Owned Business. Indian preference applicants or Indian owned businesses having social and economic ties to the Coeur d'Alene Tribe with a primary place of residence or business on the Coeur d'Alene Reservation which is owned by a Coeur d'Alene Tribal member or other Indian living on or near the Reservation.
- (T) Located on the Reservation. An employer located on the Reservation during any portion of a business enterprise or specific project, contract or subcontract, or within a 30 mile radius of Reservation boundaries.
- (U) OFCCP. Shall mean the Office of Federal Contract Compliance Programs of the United States.
- (V) Prime Contractor. A prime contractor is the prime/general construction, forestry, or mining contractor with responsibility for all phases of construction or similar contracts.
- (W) Reservation. Shall mean the Coeur d'Alene Reservation, and includes all lands, Indian and non-Indian, within the exterior boundaries of the Coeur d'Alene Reservation including but not limited to any trust lands under jurisdiction of the Coeur d'Alene Tribe.
- (X) Secretary. Shall mean the Secretary of Interior or his/her authorized representatives.

- (Y) Subcontract. A subcontract is any contract let out by a prime contractor to subcontractors for supplies or work on any prime contract, regardless of tier.
- (Z) Tribal Council. Shall mean the Tribal Council of the Coeur d'Alene Tribe.
- (AA) Tribal Member. Shall mean any person who is an enrolled member of the Coeur d'Alene Tribe.
- (BB) Tribe. Shall mean the Coeur d'Alene Tribe.

**41-6.01      Appointment of Board Members**

The Tribal Employment Rights Board shall be comprised of five members and one alternate appointed by the Tribal Council.

**41-7.01      Terms of Office of Board Members**

The members of the Board shall be appointed for a term of three (3) years. The Council will fill each vacancy by appointing a new member or reinstating the member whose term is expiring. The alternate will replace any member who is removed or for some other reason cannot fulfill his/her term. The alternate will also sit in place of any member of the Board who is absent, but whose presence is required to create a quorum.

**41-8.01      Removal from Office**

Any Board Member can be removed from office by vote of Tribal Council.

**41-9.01      Vacancy and Interim Appointment**

If a Board Member dies, resigns, or is removed from office, a vacancy on the Board shall be created automatically and the alternate shall fill the term. If the alternate is not available, the vacancy shall be filled by a temporary appointment made by the Tribal Council.

**41-10.01      Chairperson**

T.E.R.O. Board members shall elect the Chairperson on an annual basis. The Chairperson shall preside at all formal and informal meetings and hearings of the full Board.

**41-11.01      Duties of The Board**

The Board or its authorized representative(s) shall administer the Employment Rights Program of the Coeur d'Alene Tribe in accordance with this Chapter and will adopt bylaws under which it will operate internally.

**41-12.01**      **Powers of the Board**

The Board or its authorized representative shall have the power:

- (A) To make recommendations to Tribal Council when hiring or replacing Board members.
- (B) To establish rules and regulations governing all activities of the Manager that will be consistent with the existing Chapter. Tribal Council must approve any changes before implementation.
- (C) To make recommendations to the Tribal Council on amendments to the Chapter.
- (D) To make recommendations to the T.E.R.O. Manager to expend funds appropriated by the Tribal Council for the Tribal Employment Rights Program and to administer additional fees provided by T.E.R.O. Fees collected from contractors/employers from contracts provided herein.
- (E) To review whether to enter into Union Labor Agreements.
- (F) To facilitate and hold hearings and to subpoena witnesses and documents in accordance with this Tribal Chapter.
- (G) To take such other actions consistent with this Chapter as is necessary to achieve the purpose and objectives of the Tribal Employment Rights Office.
- (H) The Board, including any of its agents, employees or delegates, will retain all rights and privileges of sovereign immunity of the Coeur d'Alene Tribe.

**41-13.01**      **Directive to the Board**

- (A) In establishing and maintaining the numerical goals provided for in this Chapter. The Board and Manager will monitor numerical quotas and implement these training privileges, whenever practical, and will consult with affected employers so as to consider their input and recommendations.
- (B) The Board shall hold such formal and informal meetings and regulate procedure, as it deems necessary in order to carry out effectively its duties and powers under this Chapter.
- (C) The Board shall attempt whenever possible to administer this Chapter and execute its power under consensus vote. If a consensus cannot be achieved, then the T.E.R.O. Chairperson must make the deciding vote. An affirmative vote of at least three (3) Board Members is required to render approval of any effective decision or action.

- (D) All written agreements or plans, directives, orders, complaints, and appeals which the Board is authorized or required to issue or file hereunder will bear the signature of at least two Board Members.

**41-14.01      Appointment and Removal of Employment Rights Manager**

The Council through Tribal administration will appoint the Manager to serve on a full-time basis as the staff manager for the Board. The Council and Tribal administration may consider Board recommendations concerning appointment and removal of the Manager.

**41-15.01      Duties and Powers of the Manager**

The Manager will be subject to the day-to-day supervision and direction of the Human Resources Director in the performance of his/her duties and will be subject to Tribal Policies and Procedures. Policy and general guidance regarding T.E.R.O. implementation is to be provided by the Board, with ultimate T.E.R.O. policies to be established by Tribal Council. Routine or administrative correspondence is delegated to the Manager subject to the above supervision with some policy guidance at limited times by the Board, and will include but is not limited to the following:

- (A) To obtain funding from Federal, State or other sources to supplement Tribal Council appropriations.
- (B) To establish numerical hiring goals and timetables specifying the minimum number of Indians an employer must hire for each trade and skill level.
- (C) To require employers to establish or participate in On the Job Training (OJT) Programs.
- (D) To establish and administer the T.E.R.O. Compliance Office and require employer(s) to utilize the facilities.
- (E) To prohibit employers from using job qualifications, criteria or personnel requirements that may bar Indians from fair and equal employment rights unless such criteria or requirements are bona fide and necessary occupational qualifications. The Board can format regulations to adopt EEOC guidelines or additional requirements to eliminate employment barriers unique to Indians and the Reservation.
- (F) To require employers to give preference to Indian workforce and to require Indian preference in awarding of contracts and subcontracts.
- (G) To establish counseling programs to assist Indians in obtaining and retaining employment.

- (H) To require employers to submit reports and take all action deemed necessary by the Board or the Manager for fair and vigorous implementation of this Chapter.
- (I) To consider entering into cooperative agreements with Federal employment rights agencies such as EEOC and OFCCP to eliminate discrimination against Indians both on and off the Reservation.

**41-16.01 Coverage and Scope**

- (A) All employers are required to give preference to Indians in hiring, promotion training and all other aspects of employment. Contracting of Indian Preference Contractors must comply with rules and regulations of this Chapter and of the Board the foregoing shall apply to all employers located or engaged in work on the Reservation.
- (B) The foregoing requirements shall apply only to an employer located or engaged in work while on or near the Reservation. When an employer has previously agreed in a contract, lease or other document to give preference to Indians, this Chapter and authorized Board rules, regulations and directives will define the specific minimum obligations of the employer pursuant to such written agreement.

**41-17.01 Contractors and Subcontractor**

The Indian Preference requirements contained in this Chapter shall be binding on all contractors and subcontractors of employers, regardless of tier, and will be deemed part of any contract and subcontract specification. The employer shall have the initial and primary responsibility for ensuring that all contractors and subcontractors comply with these requirements.

**41-18.01 Minimum Numerical Goals and Time Tables for Indian Employment**

- (A) The Board or the Manager may establish the minimum number of Indians each employer must employ on his/her work force during any year that he or she or any of his/her employees are engaged in work on or near the Reservation. Availability of numerical goals may be set for each craft, skill, job classification, etc., used by the employer and will include, but not be limited to administrative, supervisory and professional categories. All numerical quotas can be negotiated between employer and T.E.R.O. Manager. The goals will be expressed in terms of man hours/day of Indian employment as a percentage of the total man-hours worked by the employer's work force in the job classification involved.
- (B) For both new and existing employers, the goal will be reviewed by the Board at least annually and will be revised as necessary to reflect changes in number of Indians available or changes in employer hiring plans.

- (C) Each employer will submit a semiannual report to the Manager indicating the number of Indians in his/her work force, how close he or she is meeting his/her goals, all persons hired or fired during the last six (6) months, the job positions involved, and other information required by the Board.

**41-19.01**      **Training**

Employers may be required by the Board to participate in training programs to assist Indians to become more qualified in the various job classification or trades used by the employer. This ratio of OJTP trainees can be adjusted and shall be set by the Board after consultation with Manager and employers.

**41-20.01**      **Training Administrative Fee**

Every construction, forestry or mining employer that is a Prime Contractor on the Reservation with a contract of \$50,000.00 or more will pay a training fee of .05% of the total contract dollar amount. This fee is included in a total fee of 2%. This revenue will be used for training for the T.E.R.O. applicants and placed in T.E.R.O. budget as training appropriations funding.

**41-21.01**      **Job Qualifications and Personnel Requirements**

Employers are prohibited from using job qualification criteria or personnel requirements to limit Indian employment unless such criteria or requirements are a business necessity and are bona fide occupational qualifications for employment as listed in the Dictionary of Occupational Titles or unless they are unemployable for other reasons.

- (A) Employers whom employ more than two employees may designate key personnel who are regular, permanent employees in a supervisory or other key position.
- (B) At no time will core crew and/or key personnel displace Indian preference employee(s) and/or potential Indian preference employee(s) by performing work outside their normal classification.

**41-22.01**      **T.E.R.O. Compliance Officer**

The Board will establish and administer a T.E.R.O. Compliance Officer to assist the Manager and employers in placing Indian preference employees in job positions. If the Manager determines that he/she cannot fill a work order from hiring all applicants or referrals, then the Manager must specify this in writing and release the employer, so the employer can recruit and hire workers from whatever process he/she chooses, as long as he/she complies with the Equal Opportunity Act in all hiring practices pertaining to his/her operation or contract.

**41-23.01**      **Layoffs and/or Termination**

In making any layoffs and reductions in force, all employers will maintain required ratios of Indian Preference Employees. Furthermore, no Employer will terminate or layoff any Indian preference employee who is employed pursuant to this Chapter without good cause for such termination. *Good cause for termination* will be defined as: “Failure to adequately act pertaining to employment according to the reasonable policies and procedures of the employer or any act which puts the employer or other employees in an unsafe position in the course of employment.”

The employer in determining layoffs shall apply the layoffs in a reasonable and fair fashion. Furthermore, layoffs should only occur when there is not adequate work to keep all employees on the job, adverse weather conditions, building material or supplies are inadequate and when funding shortage necessitates reduction in the work force. Where practical, employer and Manager will determine sequence of layoff, for Indian Preference percentage ratio.

**41-24.01**      **Promotion**

Every employer shall in accordance with required ratios give Indians preferential consideration for all promotion opportunities and will encourage Indians to seek such opportunities.

**41-25.01**      **Summer Students**

Employers shall give Indian students preferential consideration for summer student employment. The employer will make every effort to promote after school, summer and vacation employment for Indian students.

**41-26.01**      **Indian Preference Requirements in Awarding Contracts and Subcontracts**

The Board endorses and encourages an Indian Business Program that promotes and facilitates the success of Indian owned businesses.

- (A) Employers shall give preference in the award of contracts to Indian owned businesses. These rules and regulations apply to all construction, maintenance, and natural resources contracts that take place on or near the Coeur d’Alene Reservation. A contract or subcontract taking place “on or near the Coeur d’Alene Reservation” means 51% or more of the work under contract or subcontract is to be performed within Reservation boundaries, and/or 51% of the unfinished product or by-products comes from within Reservation boundaries.
  
- (B) Any business or Indian owned business may bid as a supplier, prime contractor or subcontractor on the Reservation, but shall not submit bids for a subcontract or to be supplier if bidding on the prime contract and shall sign a non-collusive statement for each.

- (C) The T.E.R.O. Compliance Officer shall maintain a list of Indian Preference Contractors and Indian-owned businesses. This list shall be provided and supplied to the employers for their use. On all contracts of \$50,000.00 or over, employers shall provide an approved INDIAN CONTRACTING UTILIZATION PLAN which shall conform to the Indian Preference Contracting/Subcontracting rules and regulations contained in this Chapter and must provide documentation as to:
1. How Indian and Indian preference bids were solicited; and
  2. Who was awarded the contract; and
  3. Why each contractor was awarded said contract.
- (D) On all contracts \$50,000.00 or over, no employer may commence work on the Coeur d'Alene Reservation until is has submitted a Board approved INDIAN CONTRACTING UTILIZATION PLAN setting forth how the employer intends to meet the requirements of this Chapter.
- (E) Employers on or near the Coeur d'Alene Reservation shall comply with these requirements when awarding prime contracts and subcontracts.
1. If the entity asking for bids has reason to believe that three (3) or more qualified Indian firms will bid, then the Invitation for bids shall be restricted to qualified Indian-owned enterprises and Indian organizations.
  2. If there are less than three (3) Indian bidders then the Invitation for Bids shall be open competition to Indian and non-Indian firms alike.
- (F) In the case of (1) above, the lowest qualified Indian Preference bidder shall be awarded the contract or subcontract, if within budgetary limits of the contract or within the fixed percentage as outlined below. In the case of (2) above, the lowest Indian bidder shall be awarded if:
1. The lowest responsible Indian Preference bidder is within budgetary limits established for the specific project or component of the project; and
  2. The lowest responsible Indian Preference bidder is not more than a fixed percentage higher than the total bid price of the lowest responsive bid from any qualified bidder and is willing to meet the lowest responsive bid. The fixed percentage is determined as follows:

When the lowest responsive bid is:

<b><u>At Least</u></b>	<b><u>But less than</u></b>	<b><u>Percentage of Bid</u></b>
\$ 51,000	\$200,000	10%
\$201,000	\$300,000	09%
\$301,000	\$400,000	08%
\$401,000	\$500,000	07%
\$501,000	\$1 million	06%
\$1 million	\$1.5 million	05%

Continued...

<b><u>At Least</u></b>	<b><u>But less than</u></b>	<b><u>Percentage of Bid</u></b>
1.6 million	2.0 million	04%
2.1 million	2.6 million	03%
2.7 million	3.0 million	02%
3.1 million	3.6 million	01%
3.7 million	4.0 million	01%
4.1 million	Unlimited	01%

- (G) If Indian Preference Contractor is awarded bid and needs to subcontract out, he/she must contact T.E.R.O. Office for Indian Preference Contractor(s) list.
- (H) Any contractor or subcontractor failing to provide an Indian Contracting Utilization plan shall be placed in violation status of this Chapter and subject to the sanctions as provided for in this Chapter

**41-27.01**      **Burden of Proof**

In any hearing before the Board where the issue is employer compliance with any of the requirements as stated in this Chapter, the burden of proof shall be on the employer to show compliance.

**41-28.01      Compliance Plans**

Every employer of two or more employees and every contractor or subcontractor obtaining a contract or subcontract of \$50,000 or more on or near the Reservation will abide by the T.E.R.O. Chapter and submit a completed Compliance Plan for reviewing by the Manager and then to Board for final approval. Every contractor and subcontractor with contracts below \$50,000 will also be required to abide by T.E.R.O. Chapter and submit a Compliance Plan to be approved by the T.E.R.O. Manager but will not be required to pay the 2% fee. Each employer will set forth how the employer will meet the goal of 100% Indian labor and numerical employment in each job classification and other obligations. All plans must have final approval by the Board and the Manager within thirty (30) days of initial submission request. No employer will commence work until it has submitted a Compliance Plan and the Plan has been approved.

**41-29.01      Compliance Plan for New Employers**

- (A) Existing employers who are located or engaged in work on or near the Reservation after the effective date of this Chapter shall submit a Compliance Plan or must revise their existing Compliance Plan.
- (B) Each new employer shall meet with the Manager as soon as possible prior to actually beginning work and shall furnish the Manager with a precise list of the number and kinds of employees he/she expects to employ and any special factors or circumstances the employer wishes to present. At this time the Manager and employer may work together and format a neutral, negotiated Compliance Plan. The Board will determine final approval.
- (C) Every plan will establish the goal of 100% Indian Labor force and numerical employment in each job classification when:
  - 1. Qualified Indians are reasonably available when the Plan is adopted to fill all job positions anticipated by the new employer in the job classification; or
  - 2. Qualified Indians can reasonably be expected to become available from training programs or other sources to fill all such positions during the one-year period of the plan.
- (D) If qualified Indians are not available, then Plans may provide for goals of less than 100% Indian labor and employment in affected job classifications. If for some reason the Indian Preference work force is unavailable and the T.E.R.O. Manager cannot fill the work order then, with signature approval from the Manager, the employer may hire from an outside resources.

**41-30.01**      **Compliance Plan for Existing Employers**

- (A) Employers who are located on or are engaged in work on or near the Reservation prior to the effective date of this Chapter shall establish hiring and employment goals for new employees by establishing a new Compliance Plan.
- (B) After due notice, each existing employer shall meet with the Manager, as required, and shall furnish a reasonably specific list of the number and kinds of new employees he/she expects to employ in the ensuing year. The Manager and the employer shall conclude a new percentage goal ratio after considering any special factors or circumstances the employer wishes to present.
- (C) Compliance Plans for existing employers shall establish the goals of 100% Indian employment for new hiring in each job classification if qualified Indians can reasonably be expected to become available to fill such new positions during the duration of the Plan. If qualified Indians are not available, the Plans may provide for goals of less than 100% Indian Labor and employment in affected job skills or classifications.

**41-31.01**      **Revision of Compliance Plans: Semiannual Employer Reports**

- (A) Each employer with a Compliance Plan shall submit semiannual reports to the Manager, or other report as otherwise directed by the Board, on a form provided indicating:
  - 1. The number of Indians in his/her work force.
    - a. Training program for updating Indian workforce.
    - b. Additional needs that will benefit Indian workforce.
  - 2. How close he/she is to meeting his/her goals.
  - 3. The number of persons hired or terminated for the last six months and the affected job positions; and
  - 4. Any other information specified by the Board and reasonably necessary to monitor the employer's efforts to abide by the Compliance Plan.
- (B) The Manager shall meet with each new and existing employer to review the goals of every Compliance Plan. Any plan may be revised at any time after meetings between the Manager and employer when necessary to reflect changes in the number of qualified Indians available or changes in employer hiring practices.

**41-32.01**      **Final Approval of Compliance Plans**

The Board must approve each Compliance Plan or revision before the Plan becomes effective.

**41-33.01**      **Noncompliance or Violations**

If any employer fails or refuses to comply with the Compliance Plan requirements herein or with the terms of its Compliance Plan, as written, such noncompliance shall be deemed a violation of this Chapter and subject to sanctions provided for in this Chapter.

**41-34.01**      **Recognition of Unions**

Nothing herein or any activity by the Board or the Manager authorized hereby shall constitute official Tribal recognition of any union or Tribal endorsement of any union activities on the Reservation.

**41-35.01**      **Notice**

If a hearing is requested by the Board, the Manager, an individual, or an employer pursuant to this Section, the Strike: Commission Insert: Board shall cause a written notice of hearing to be served upon all concerned parties stating the nature of the hearing and the evidence to be presented. The notice shall advise such parties of the alleged violation, their required presence or the presence of a representative on their behalf, their right to be present at the hearing, and to present testimony of witnesses or other evidence, and to be advised by counsel at their own expense.

**41-36.01**      **Complaints**

- (A) Complaints Regarding Violations. Any affected individual, employer, entity, organization or interested party that believes any covered employer or its agents has violated or is in violation of this Chapter or any rules or regulations issued pursuant to it may file a complaint with the Manager, a Board Member, or the Board's authorized agent. The complaint shall be in writing and shall provide such information as is necessary to enable the Manager to carry out an investigation. The Manager shall investigate every complaint filed. If upon investigation, the Manager has reason to believe a violation has occurred, the Manager shall proceed pursuant to the provisions provided for in this Chapter. Within 20 days after receipt of the complaint, and on a regular basis thereafter, the Manager shall provide the complaining party with a written report on the status of the complaint.
- (B) Time and Place of Filing Complaints. Complaints filed under subsection (A) above shall be filed by the charging party with the Board or its authorized agent within seven (7) working days after the alleged unlawful violations(s) occurred or

seven working days after the charging party learned of the alleged unlawful violations(s), but no complaint shall be accepted after seven (7) days from the date of alleged violation or occurrence. The complaint shall include the date, place and circumstances of the alleged unlawful violation(s) and shall be served by the charging party upon the person(s) against whom the charge(s) are made within 10 days thereafter.

- (C) Complaints Regarding Administrative Act of T.E.R.O. Manager. Any individual employer, employee or other party may challenge any action of the Manager by filing a written complaint with the Manager, the Board, or its authorized agent within five (5) days from said action and requesting a hearing thereon. The Board shall review the complaint within 10 days and may, at their discretion, set a hearing date.
- (D) Service of Complaints. Service may be made by registered mail or hand delivery with a receipt.

#### **41-37.01**      **Investigations**

On its own initiative or pursuant to any complaint, the Board or the Manager may make an investigation on or near the Coeur d' Alene Reservation. If the Manager or Board Members deem it appropriate and necessary to determine whether any provision of this Chapter or any rules, regulations or orders hereunder have been violated, then an investigation may occur.

- (A) The Manager or his/her duly authorized delegate may enter, during business hours, the place of business or employment of any employer he/she deems necessary to monitor compliance within the requirements of this Chapter or any rule or orders hereunder.
- (B) The Manager or his/her delegate shall bear and show official identification adequate to identify them as authorized agents of the Board to make such investigation.
- (C) In any hearing before the Board, where the issue of employer being put in "out of compliance" status, it will be the employer's responsibility to demonstrate compliance.

#### **41-38.01**      **Hearing Procedure**

Hearings shall be governed by the following rules of procedure:

- (A) All parties may present testimony of witnesses and other evidence and may be represented by counsel at their own expense.
- (B) The Board may have the advice and assistance of counsel provided by the Tribe.

- (C) The Chairperson of the Board, or the Vice-Chairperson, shall preside and the Board shall proceed to ascertain the facts in a reasonable and orderly fashion.
- (D) The hearing may be adjourned, postponed or continued at the discretion of the Board.
- (E) At the final close of the hearing, the Board may take immediate action or take the matter under advisement.
- (F) The Board shall notify all parties in writing within thirty (30) days after the sharing of its decision in the matter.
- (G) If any party fails to appear for a hearing then it may be ruled as forfeiture by default.

**41-39.01 Power to Require Testimony and Production of Records**

The Board Member or the Manager, or any designee, may administer oaths or affirmation, subpoena witnesses, take evidence, and require, by citation, the production of books, papers, contracts, agreements or other documents, records or information which the Manager or the Board deems relevant or material to the inquiry.

- (A) Review of T.E.R.O. Files. The Respondent (the employer or entity against whom a charge has been filed) shall have the right to review the case file of the Manager by scheduling an appointment with him or her for that purpose during regular working hours at any point after receiving notice of hearing. The Manager may remove any portion of a file to protect what is deemed confidential.
- (B) List of Witnesses. Ten days prior to the hearing (or as soon as possible if the hearing is to be held within 10 working days after notice), the Respondent and the Manager shall submit to the Board Chairperson a list of witnesses he/she intends to call at the hearing, with the approximate length of their testimony, and the general substance of said testimony. It shall indicate any witnesses that must be subpoenaed. The Board shall then cause necessary subpoenas to be issued.
- (C) Expert Witnesses. Any party who intends to present testimony of any expert, on their behalf shall within five (5) days of hearing, provide the Board and the opposing party the name, qualification, and the substance of said expert testimony. Failure to do so shall disqualify such testimony from the hearing.
- (D) Pre-Hearing Interview of Witnesses. The Respondent and the Manager shall have the right to interview the witnesses of the other party prior to the hearing. The Manager's witnesses shall be interviewed in the presence of the Manager or his/her delegate. The Respondent's witness shall be interviewed under such reasonable conditions as are established by the Respondent. Either party may appeal to the Chairperson of the Board if cooperation is not forthcoming on this

matter. The Chairperson is empowered to require such steps as are necessary to resolve the problem.

- (E) Production of Documents. The Parties shall provide each other with a list of documents, papers and tangible evidence that is intended to be introduced at the hearing, including a statement regarding the substance and relevance of each. Said documents; papers and tangible evidence shall be made available to one another forthwith, no later than ten (10) days prior to the hearing, or within two (2) days if the hearing date is noticed less than ten (10) days before the hearing. Failure to produce such lists and documents listed within the time prescribed, may render said documents inadmissible at the hearing, on motion of the opposing party and in the Board's discretion.
- (F) Postponements. Any request for a postponement of the hearing must be submitted in writing to the Chairperson of the Board no fewer than three days prior to the hearing. However, if the Manager and Respondent mutually submit a request for a postponement because there is a possibility of settling the matter, the request for a postponement may be submitted at any time prior to hearing.

**41-40.01**      **Conduct of the Hearing**

- (A) Presiding Official. As presiding official, the Chairperson or a designated Board Member will control the proceedings. He or she will take whatever action is necessary to insure an equitable, orderly, and expeditious hearing. Parties will abide by the presiding official's ruling. The presiding official has the authority to:
  - 1. Administer oaths or affirmations;
  - 2. Regulate the course of the hearings;
  - 3. Rule on offers of proof;
  - 4. Limit the number of witnesses when testimony would be unduly repetitious; and
  - 5. Exclude any person from the hearing for conduct or misbehavior that obstructs the hearing.
- (B) Manager. The Manager may represent the Board on all charges filed by it, even if the charge was initiated by a complaint filed by a private individual.
- (C) Respondent. The Respondent shall be present for the entire hearing and he/she or his/her representative (other than an attorney) shall represent him/her during the proceeding.
- (D) Attorneys. Either party may have an attorney present as an advisor. However, the attorney may not make any presentations, cross-examine witnesses or address the Board.

- (E) Recording of the Hearing. All hearings shall be recorded in full and the Board shall retain the tapes(s) for no less than one year after the hearing. The Respondent shall also be permitted to tape the hearing upon request.
- (F) Prohibition Against Reprisals. All parties shall have a right to testify on their own behalf, without fear of reprisal.
- (G) Starting Time. The hearing shall be open promptly at the time specified by the Board.
- (H) Opening Statements. Both parties will be afforded the opportunity to present opening statements with respect to what they intend to prove at the hearing.
- (I) Order of Proceeding. The Complainant or his/her representative will present his/her case first. The Manager will often be the Complainant in those proceedings.
- (J) Examination and Cross Examination of Witness. Both parties may subpoena and examine friendly and hostile witnesses. Both parties may subpoena and examine witnesses. However, no harassment or efforts to intimidate witnesses shall be permitted. The Board members may examine witnesses at any point in their testimony. The testimony of all witnesses shall be under oath or affirmation.
- (K) Irrelevant Testimony. Parties may object to clearly irrelevant material, but technical objections to testimony as used in a court of law will not be entertained. The Board shall prohibit any testimony that it deems clearly irrelevant in order to keep control of the hearing.
- (L) Written Testimony. Evidence or exhibits may be presented. Written testimony will be admitted into evidence during the hearing only when a witness cannot appear in person. When a party wishes to use the written testimony of a witness who cannot appear, the party wishes to use the written testimony of a witness who cannot appear, the party must submit, in advance of the hearing, a written explanation for the nonappearance of the witness to the Board. If the Board is satisfied with the explanation, the parties will obtain the testimony by the means of deposition. When, for reasons satisfactory to the Tribal Employment Rights Board, a deposition cannot be used, an affidavit or sworn statement from the witness may be used. A signed, but uncertified statement will not be admitted into evidence.
- (M) Closing Statement. Closing statements for each party will be permitted. The Complainant shall proceed first.

- (N) Audience. The hearing shall be open to the public. However, the Board may remove any person who disrupts the hearing or behaves in an inappropriate manner. Also, the Board may order a hearing closed, if it deems appropriate.

**41-41.01**      **The Decision**

The decision shall be in writing and issued within 30 days after the hearing. The decision shall consist of the following parts, in the following order:

1. The facts as found to be true by the Board;
2. The finding of violation or no violation on each charge along with the legal and factual basis for the finding;
3. The orders and/or sanctions imposed, if any;
4. Information on rights to appeal;
5. Information on the authority of the Board to act if the party fails to comply with its orders or fails to appeal; and
6. The injunctive or bonding requirements, if any, that the Board will seek from the Tribal Court pending the completion of the appeal if an appeal is filed.

**41-42.01**      **The Record**

The Board shall include in the record copies of all documents and descriptions of information used in arriving at the decision and shall maintain and store said record for a period of one year from the date of decision.

**41-43.01**      **Finality of the Decision – Appeal**

Decisions of the Board will be effective immediately and final when the time for filing a Notice of Appeal has expired. An aggrieved party may take any appeal to the Coeur d' Alene Tribal Court as provided in this Chapter.

The Board's decision is final and shall be in writing. It shall be served on the charged party by registered mail or in person no later than thirty (30) days after the close of the hearing. Should the party fail to comply immediately with the Board's Order, the Board shall request the Tribal Court, and the Tribal Court shall grant, such injunctive relief as necessary to preserve the rights of the beneficiaries of this Chapter, pending the party's appeal or expiration of the time for appeal.

**41-44.01**      **Enforcement and Penalties for Violation(s)**

The Manager is authorized to enforce this Chapter and the rules and regulations of the Board. He/she may issue citations to violators and initiate investigations for the purpose of settling disputed violations or formally enforcing this Chapter and the rules and regulations of the Board as follows:

- (A) Informal Settlement. If upon investigation initiated by the filing of a complaint pursuant to this Chapter or on his/her own initiative, the Manager has reason to believe a violation has occurred, the Manager shall issue written notice of violation to the alleged violator. The Manager and the employer shall seek to achieve an informal settlement of the alleged violation immediately. If no settlement can reasonably be made, he/she shall issue a formal Citation and Notice of Non-Compliance.
- (B) Formal Citation and Notice of Non-Compliance. The formal Citation and Notice of Non-Compliance shall set out the nature of the alleged violation and the steps that must be taken to come into compliance. The violator will be allowed five days to comply with said Notice of Non-Compliance and request in writing a hearing before the Board on the matter. This time may be shortened at the Manager's discretion should he/she feel irreparable harm will occur should the violation continue.

If the violator refuses to comply with requirements within the time imposed by the Manager and has not requested a hearing before the Board on the matter pursuant to this Chapter, the Manager may seek to impose one or more penalties below upon said violator. After being fully advised on the matter, the Board may issue an order imposing such penalties it deems necessary.

#### **41-45.01      Enforcement**

Any employer, contractor, subcontractor or union who is found in violation of this Chapter or rules, regulation or orders of the Board or the Manager shall be subject to below penalties for such violations.

#### **41-46.01      Penalties**

- (A) Denial of right to commence or continue business on or near the Reservation.
- (B) Suspension of all working operations.
- (C) Payment of back pay and damages to compensate any injured party.
- (D) An order to summarily remove employees hired in violation of this Chapter or rules, regulation or orders of the Board or the Manager.
- (E) Imposition of monetary civil penalties.
- (F) An order requiring changes in procedures and policies necessary to eliminate the violation(s)

- (G) An order requiring employment, promotion and training of the Indians injured by the violation.
- (H) An order making any other provision deemed by the Board necessary to alleviate, eliminate, and compensate for any violation(s).
- (I) Imposition of one-time 10% penalty fee on all amounts due on monetary orders by the Board if not paid by the employer within thirty (30) days of the initial judgment. If said judgments are not paid within sixty (60) days or the initial billing, the employer will be assessed a one-time 30% penalty fee in addition to the 10% referred to above. After sixty (60) days, interest will accrue at the rate of 1% per month on any unpaid balance.
- (J) In enforcement and collection action becomes necessary for any Board order, the Respondent shall pay all attorney fees and costs incurred in such proceedings.
- (K) The maximum penalty, which may be imposed, is \$5,000 for each violation. Each day during which a violation exists shall constitute a separate violation.

**41-47.01      Rights to Appeal**

Any party to a hearing shall have the right to appeal any decision of the Board to the Coeur d'Alene Tribal Court by filing a Notice of Appeal with the said Court within 20 days of the Final Decision of the Board.

**41-48.01      Scope of Review**

The Tribal Court shall uphold the decision of the Board unless it is demonstrated that the decision of the Board is arbitrary, capricious, unsupported by the weight of the evidence or in excess of the authority of the Board.

**41-49.01      Method of Appeal**

The appeal shall be taken by serving a written Notice of Appeal with the Tribal Court, with a copy to the Manager, both within 20 days after the date of the entry of the Board's order. The Notice of Appeal shall:

- (A) Set for the order from which the appeal is taken;
- (B) Specify the grounds upon which reversal, modification or order is sought; and
- (C) Be signed by the appellant.

**41-50.01**      **Bond on Appeal**

The Manager may petition and, for good cause shown, the Court may order the party requesting a hearing to post a bond sufficient to cover the monetary damages that Board previously assessed against the party. The Court can also issue an additional amount to assure the party's compliance with other sanctions or remedial actions imposed by the Board's order if the Court upholds that order.

**41-51.01**      **Purpose and Procedure**

- (A) When a party has failed to pay any monetary damages that it was subject to, and has failed to otherwise comply with an order of the Board within 21 days after its decision, and an appeal has been filed, the Board may petition the Court to order the Tribal police to confiscate, and hold for sale, such property of the party as is necessary to ensure payment of said monetary damages or to otherwise achieve compliance.
- (B) Said petition shall be accompanied by a list of property belonging to the party which the Board has reason to believe is within the jurisdiction of the Tribal Court, the value of which approximates the amount of monetary damages at issue. If the Court finds the petition to be valid, it shall order the Tribal police to deliver in person or by certified mail a notice to the party informing it of the confiscation and of its right to redeem said property by complying with the order outstanding against it.
- (C) If, thirty (30) days after confiscation, the party has still not come into compliance, the Court may order the police to sell said property and proceeds of which shall be used to pay any outstanding fees and damages and to pay any costs incurred by the Court and police in the confiscation and sale.

**41-52.01**      **Reporting and On-Site Inspection**

Employers shall submit reports and other information requested by the Board or the Manager. The Manager and his/her representatives shall have the right to make on-site inspections during regular working hours in order to monitor any employer's compliance with this Chapter and rules, regulations and orders of the Board. The Manager and/or his/her representatives shall have the right to inspect and copy all relevant records of any employer, or any signatory union or subcontractor and shall have the right to speak to workers and conduct investigations on job sites. Failure by the employer to comply with this paragraph shall be in violation of the Chapter and is subject to sanctions outlined in this Chapter.

**41-53.01**      **Board Funds**

All funds from employer fees and other sources collected by the Board, although under the management and control of the T.E.R.O. Manager, will be used only for T.E.R.O. purposes

and such funds are subject to the controls, processes, Procedures and Policies of the Finance Department.

**41-54.01**      **Employment Administrative Fee**

T.E.R.O. fees apply to all construction, timber and mining contracts within Reservation boundaries, subject to exemptions previously discussed. The Manager shall assess employers in order to provide revenue for the operation of the Tribal Employment Rights Office as stated in this Chapter.

However, the Coeur d'Alene Tribe, the State of Idaho, and the Federal Government, along with any subdivision thereof may be excluded from the T.E.R.O. Fee with the approval of the T.E.R.O. Board and final signature approval from Tribal Council.

**41-55.01**      **Contractors**

Every prime or general contractor obtaining a contract of \$50,000 or more shall pay an Employment Administration Fee equal to 2.0% of the total amount of each contract on the Reservation. For contracts that will be completed on and off of the Reservation, only the work conducted on the Reservation shall be subject to the Employment Administrative Fee. One-half (0.5) percent (%) of the 2.0% will be submitted to the T.E.R.O. training and 1.5% will be submitted into the T.E.R.O. General fund.

**41-56.01**      **Accounting**

Employment Administrative Fees shall be paid to the Coeur d'Alene Tribe and placed in a special account for use only by the Tribal Employment Rights Office. The Tribal Employment Rights Office is authorized to establish such rules and regulations as are necessary to assure fair and timely fee collection process. Any employer or contractor who fails to pay the required employment fee shall be subject to sanctions provided for in this Chapter. Contracts completely off of the Reservation will be exempt from the T.E.R.O. fee, but will still be subject to the T.E.R.O. Chapter for employment preference.

**41-57.01**      **Equal Employment Opportunities**

No employer shall discriminate against any Indian Preference employee or applicant for employment because of color, religion, sex, national origin or age, except as permitted by law, and must assure that advertisements include equal opportunity for access.

**41-58.01**      **Equal Pay**

Every employer shall be required to provide equal pay to Indian preference employees performing work similar or comparable to other employees or core personnel.

**41-59.01**      **Federal, State and Local Agencies**

The Board or the Manager may use Federal, State, Local or Tribal agencies in resolving a discrepancy concerning wages and hours worked.

Any employer who is in violation to the above paragraphs shall be subject to the penalties outlined in this Chapter.

**41-60.01**      **Health, Welfare and Pension Fund Benefits**

Payroll deductions by employers will be permissible for the purpose of providing medical, hospital care, pension, annuities, retirement, death benefits, compensation for injuries, illness, accidents, sickness or disabilities. These deductions are applied to payment of insurance to provide all or any of the foregoing, including unemployment benefits, vacation pay, savings accounts, or similar payments for the benefit of employees, their families and dependents will be provided by employer; HOWEVER, the following standards much be met:

- (A) Law may not prohibit the deduction.
- (B) It is either:
  - 1. Voluntarily consented to by employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for obtaining or for the continuation of employment, or
  - 2. Provided for in a bona fide collective bargaining agreement between the contractor and subcontractor or any affiliated person in the form of Board, dividend, or otherwise;
- (C) No profit or other benefit is otherwise obtained, directly or indirectly, by the contractor or subcontractor or any affiliated person in the form of Board, dividend, or otherwise;
- (D) The deduction shall serve the convenience and best interest of the employee.

All CONTRACTORS must provide a health and welfare benefit package plan for all T.E.R.O. referrals workforce consistent with packages provided to other employees, and will be responsible for implementation and assurance of this plan or must provide for the monetary equivalent for such benefits.

**41-61.01**      **Safety, Health and Environmental Protection**

In project contracts of \$50,000.00 or greater and in which the Board determines the project may have an impact on the Reservation environment, a written plan must be submitted to the Manager. The plan must include an explanation providing for the protection of health and

the environment of employees and other persons and prevent damage to property, materials, equipment and the physical environment of the Coeur d'Alene Reservation. Any employer or contractor who fails to provide such plan or failure to follow or carry out such plan shall be deemed in violation of this Chapter and is subject to penalties outlined in this Chapter. This plan will be routed to the Natural Resource Department for review and monitored for compliance.

**41-62.01**      **Rules and Regulations**

The Board may from time to time adopt detailed rules, regulations, policies and guidelines consistent with and necessary for full implementation of this Chapter.

**41-63.01**      **Severability**

If any provision of this Chapter, or its application to any person or circumstances is held invalid, the remainder of the Chapter, or the application of the provision to other persons or circumstances is not affected.

# **PART 5**

## **GENERAL REQUIREMENTS**

**SECTION 00 31 32  
GEOTECHNICAL DATA**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. Location of Work: Plummer, Benewah County, Idaho.
  - 1. A geotechnical report has been prepared for the proposed Plummer Community Wastewater Improvement Site.

1.02 LIMITATIONS OF GEOTECHNICAL DATA

- A. Soil logs represent the soils and water table at the location and time the logs were completed. Information may vary based on time of year and other environmental conditions.

1.03 ATTACHMENTS

- A. Attachment A – Groundwater Elevation Evaluation, Plummer, ID, December 6, 2018, White Shield, Inc.

**END OF SECTION**



December 6, 2018

Dan Remmick  
Century West Engineering  
1110 W Park Place, Suite 303  
Coeur d'Alene, ID 83814

Groundwater Elevation Evaluation  
**Proposed Plummer Sewage Treatment Lagoon**  
**Plummer, ID**  
WSI File No. 118-077-01

Dear Mr. Remmick:

This letter presents the results of our geotechnical assessment of estimated high groundwater elevation within the proposed Plummer sewage treatment lagoon site in Plummer, Idaho, as shown on the Vicinity Map, Figure 1. Our field services were performed on September 26, 2018.

## INTRODUCTION

At present, the existing site location has been cut mostly level, with small creeks running to the north and west, and bordered by rail lines on the south and east. The site is the location of prior sewage treatment lagoons which were decommissioned between 2009 and 2012. We understand that new smaller, updated lagoons are planned for the site and you have requested that we estimate high groundwater elevation through the use of geotechnical test pits.

## SITE CONDITIONS

### Surface Conditions

We visited the site and made our observations on September 26, 2018. The site is generally shown on the Vicinity Map, Figure 1. The site is generally level ground that has been graded in the past to construct the prior lagoons and subsequently, to decommission and level the site of these lagoons. Creek elevations to the north and west are roughly 10 feet below site grade at this time. We noted that there was a steep hillside to the south of the railroad tracks at the sound end of the site. We observed sparse vegetation across the site, with vegetation to the north of the site consistent with periodic high groundwater, to surface water.

**Geology:** The geologic units for this area are mapped on the Geologic map of Idaho by J. G. Bond, et al., (Idaho Bureau of Mines and Geology, 1978). The project site is mapped as middle Miocene basalt flows of the Columbia Plateau (Tm2b). These flows are described as Miocene basalt flows of western Idaho, commonly finely crystalline and exposed on upper slopes.

Our test pits generally exposed significant amounts of basalt gravel and cobble with sands and clays in the interstices, overlying hard basalt rock below. Based on our explorations we agree with the geologic assessment of the area.

**Explorations:** We performed 6 geotechnical test pits across the site with a trackhoe excavator. Test pits were located in the field by an engineer with White Shield, Inc. (WSI) and logged accordingly. Locations of the test pits can be seen in the Site Map in Figure 2. In general, we found dry basalt gravel and cobbles mixed with sands and clays at the near surface. Below this layer we encountered more basalt gravel and cobbles with varying amounts of sands and clays becoming increasingly wet with depth. Test pits were logged according to the Unified Soils Classification System (Figure 3). Test pit logs are attached in Figure 4 attached.

**Hydrogeology:** The intent of our explorations was to locate existing groundwater elevations, below surface grade, and catalog soil profiles for any evidence of mottling which would indicate high groundwater elevations. Test pit 1 was becoming moist at the point we encountered basalt bedrock at 8 feet below grade. We observed static groundwater within test pits 2-6. We also observed mottling in soil layers in test pits 2-5, generally within 1-2 feet of surface elevations. Test pits 5 and 6 broke into what we interpret as perched water deposits that flowed into the test pits. All test pits were allowed to remain open until static water levels were able to be measured. At that point all perched water deposits had quit flowing.

## CONCLUSIONS

Groundwater elevations will fluctuate seasonally due to surface water infiltration and subsurface water flow from higher elevations. To accurately determine groundwater elevations piezometers should be installed and monitored for a period of one year. Our services were intended to estimate existing and estimated high groundwater elevations, below surface grade.

We observed static groundwater elevations across the site ranging from 6.5 feet to 9.5 feet below surface grade. Based on mottling observed within the soils and vegetation observed on site, we would expect high groundwater elevation to temporarily range between 2.0 feet below surface to grade at wetter times of the year to the depths measured at this time. We would also expect groundwater elevations to be higher at the south end of the site grading down to the north end of the site due to the surrounding topography.

We also viewed well water logs within the area of the site. Static water levels within these wells are highly variable, but in general more recently installed wells show static water levels between 65 and 100 feet below grade. The presence of basalt rock underlying the site will tend to act as a confining layer. The groundwater elevations that are found on site are likely perched water and not based on a regional groundwater table, and thus are highly variable due to precipitation and irrigation of upslope areas.

## **CLOSURE**

WSI has prepared this geologic hazard assessment letter for Dan Remmick and his agents, for use in regard to estimation of groundwater elevation within the Plummer sewage lagoon site, and for the preliminary planning and design of the development planned on this site only. The scope of our work does not include services related to construction safety precautions and our general recommendations are not intended to provide geotechnical engineering design methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. Our conclusions and interpretations should not be construed as a warranty of subsurface conditions. A contingency for unanticipated conditions and need for explorations and geotechnical input should be included in the budget and schedule.

It should be noted that this groundwater assessment is not intended to be, nor should it be considered, a geotechnical engineering exploration, evaluation, and/or analysis of the project site. A separate geotechnical evaluation either prior to, or during site development and construction, should be performed for this property.

Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted engineering geologic practices in effect in this area at the time this report was

prepared. No other warranty, expressed or implied, is made. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the owner.

0-0-0

We appreciate the opportunity to be of service to you. If there are any questions concerning this report or if we can provide additional services, please call.

Sincerely,

**WHITE SHIELD, INC.**

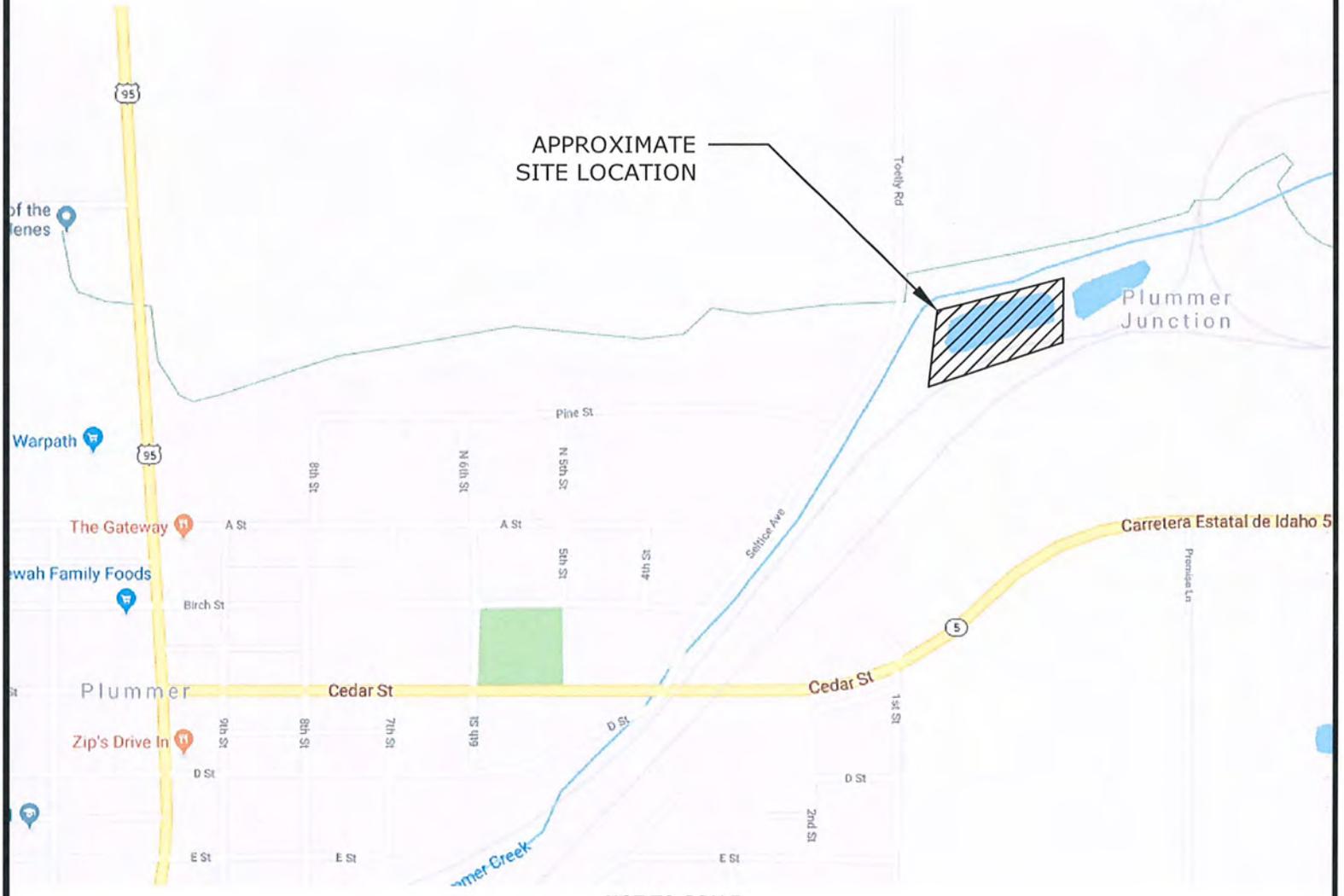


Benjamin P. Staehr, PE  
**Senior Engineer**



Michael T. Black, PE  
**Principal Engineer**

Four Attachments



NOT TO SCALE

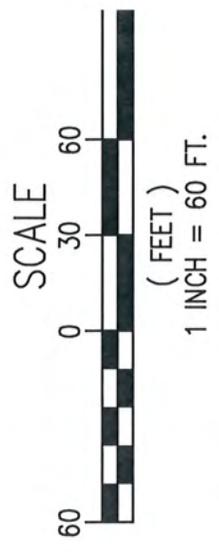
Project Number  
118-077-01

Figure 1

**GROUNDWATER EXP.  
PLUMMER JUNCTION  
PLUMMER, ID  
VICINITY MAP**



No.	Date	Revision	By	CK
1	11/15/18	Original	BPS	



nate based on field measurements.

Project Number

# UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE - GRAINED SOILS  MORE THAN 50 % RETAINED ON NO. 200 SIEVE	GRAVEL  MORE THAN 50 % OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED, FINE TO COARSE GRAVEL
		GRAVEL	GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND  MORE THAN 50 % OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE - GRAINED SOILS  MORE THAN 50 % PASSES NO. 200 SIEVE	SILT AND CLAY  LIQUID LIMIT LESS THAN 50 %	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY  LIQUID LIMIT 50 % OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
			ORGANIC	OH
HIGHLY ORGANIC SOILS			PT	PEAT

**NOTES:**

- 1) Field classification is based on visual examination of soil in general accordance with ASTM D 2488-93.
- 2) Soil classification using laboratory tests is based on ASTM D 2488-93.
- 3) Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

**SOIL MOISTURE MODIFIERS:**

- Dry - Absence of moisture, dusty, dry to the touch
- Damp - No visible water, leaves hand dry.
- Moist - Leaves water or mud on hand.
- Wet - Visible free water or saturated, usually soil is obtained from below water table

Project Number  
118-077-01

GROUNDWATER EXP.  
PLUMMER JUNCTION  
PLUMMER, ID  
SOIL CLASSIFICATION



No.	Date	Revision	By	CK
1	11/15/18	Original	BPS	

Figure 3



# TEST PIT TP-1

PROJECT NUMBER 118-077-01	EXCAVATION DATE 9/26/18	COORDINATES 47.339785, -116.873798
PROJECT NAME Plummer Groundwater Elev.		COORD SYS GPS
CLIENT Century West Engineering		SURFACE ELEVATION 2650 ft
ADDRESS Plummer, Idaho	EXCAVATION METHOD Trackhoe	LOGGED BY BPS
	TOTAL DEPTH 8.5	

## COMMENTS

Depth (ft)	Material Description	Graphic Log	USCS	Blow Count	Samples	Laboratory Test	Penetration Resistance
1	Brown clayey SAND and Medium to coarse gravel and cobble (dry, loose, angular)		SC				
2							
3	Dark brown sandy CLAY and Medium to coarse gravel and cobble (damp, soft, angular gravel, organic odor)		CL				
4							
5							
6	Dark brown-gray sandy CLAY and Coarse to medium gravel and cobble (moist, soft, angular gravel)		CL				
7							
8	Weathered basalt		GP				
9	Test pit met refusal on basalt at 8.5 ft on 9/26/18						
10							
11							
12							
13							
14							



# TEST PIT TP-2

PROJECT NUMBER 118-077-01	EXCAVATION DATE 9/26/18	COORDINATES 47.339998, -116.872900
PROJECT NAME Plummer Groundwater Elev.		COORD SYS GPS
CLIENT Century West Engineering		SURFACE ELEVATION 2647 ft
ADDRESS Plummer, Idaho	EXCAVATION METHOD Trackhoe	LOGGED BY BPS
	TOTAL DEPTH 10.3	

## COMMENTS

Depth (ft)	Material Description	Graphic Log	USCS	Blow Count	Samples	Laboratory Test	Penetration Resistance
1	Brown clayey SAND and Medium to coarse gravel and cobble (dry, loose, angular) Mottling observed around 1.5 feet bgs		SC				
4	Brown sandy CLAY and Medium to coarse gravel and cobble (damp, soft, angular gravel, organic odor)		CL				
5	Dark brown-gray CLAY some Fine to medium sand some Medium to coarse gravel and cobble (moist, soft, angular gravel)		CL				
9	Brown-gray COBBLES and gravel, little clay, little fine sand (dense, wet, angular gravel)		GC				
10	Weathered basalt		GP				
10.3	Test pit met refusal on basalt at 10.3 ft on 9/26/18						
11							
12							
13							
14							



# TEST PIT TP-3

PROJECT NUMBER 118-077-01	EXCAVATION DATE 9/26/18	COORDINATES 47.340060, -116.872236
PROJECT NAME Plummer Groundwater Elev.		COORD SYS GPS
CLIENT Century West Engineering		SURFACE ELEVATION 2645 ft
ADDRESS Plummer, Idaho	EXCAVATION METHOD Trackhoe	LOGGED BY BPS
	TOTAL DEPTH 9.0	

## COMMENTS

Depth (ft)	Material Description	Graphic Log	USCS	Blow Count	Samples	Laboratory Test	Penetration Resistance
1	Brown COBBLE some Coarse to fine gravel some clayey sand (dry, loose, angular)		GC				
2	Light brown/red/white Medium to coarse SAND and Fine to coarse gravel, little cobble (damp, loose) Mottling observed within layer		SW				
3	Reddish brown Medium to coarse SAND and Fine to medium gravel, little clay layers (damp, loose)		SP				
5	Gray CLAY and Medium to coarse gravel and cobble (moist, soft)		CL				
8	Gray CLAY and Medium to coarse gravel and cobble (wet, soft)		CL				
9	Test pit terminated at 9.0 ft on 9/26/18						
10							
11							
12							
13							
14							



# TEST PIT TP-4

PROJECT NUMBER 118-077-01	EXCAVATION DATE 9/26/18	COORDINATES 47.339660, -116.872058
PROJECT NAME Plummer Groundwater Elev.		COORD SYS GPS
CLIENT Century West Engineering		SURFACE ELEVATION 2648 ft
ADDRESS Plummer, Idaho	EXCAVATION METHOD Trackhoe	LOGGED BY BPS
	TOTAL DEPTH 10	

## COMMENTS

Depth (ft)	Material Description	Graphic Log	USCS	Blow Count	Samples	Laboratory Test	Penetration Resistance
1 2 3	Reddish brown Medium to coarse SAND, some Coarse to fine gravel and cobble (loose, dry)  Mottling observed around 1.0 feet bgs		GW				
4 5 6	Brown sandy CLAY, little fine gravel, trace cobble (soft, damp)		CL				
7 8 9	Gray/green COBBLE, little Medium to coarse gravel, little clay (loose, moist)		GP				
10 11 12 13 14	Gray/green COBBLE, little Medium to coarse gravel, little clay (loose, wet)  Test pit terminated at 10.0 ft on 9/26/18		GP				



# TEST PIT TP-5

<b>PROJECT NUMBER</b> 118-077-01	<b>EXCAVATION DATE</b> 9/26/18	<b>COORDINATES</b> 47.339518, -116.872902
<b>PROJECT NAME</b> Plummer Groundwater Elev.		<b>COORD SYS</b> GPS
<b>CLIENT</b> Century West Engineering		<b>SURFACE ELEVATION</b> 2648 ft
<b>ADDRESS</b> Plummer, Idaho	<b>EXCAVATION METHOD</b> Trackhoe	<b>LOGGED BY</b> BPS
	<b>TOTAL DEPTH</b> 10	

## COMMENTS

Depth (ft)	Material Description	Graphic Log	USCS	Blow Count	Samples	Laboratory Test	Penetration Resistance
1	Reddish brown Fine to coarse, some Medium to coarse sand, little clay (loose, damp) Mottling observed at 1.0 feet bgs		GW				
2							
3							
4							
5	Reddish brown CLAY, little fine sand, little Fine to medium gravel (soft, moist)		CL				
6							
7							
8							
9	Gray/green CLAY and Coarse to medium gravel (soft, wet) Perched water flowing at 8.5 feet bgs		CL				
10	Test pit terminated at 10.0 ft on 9/26/18						
11							
12							
13							
14							



# TEST PIT TP-6

PROJECT NUMBER 118-077-01	EXCAVATION DATE 9/26/18	COORDINATES 47.339251, -116.873677
PROJECT NAME Plummer Groundwater Elev.		COORD SYS GPS
CLIENT Century West Engineering		SURFACE ELEVATION 2650
ADDRESS Plummer, Idaho	EXCAVATION METHOD Trackhoe	LOGGED BY BPS
	TOTAL DEPTH 8.5	

## COMMENTS

Depth (ft)	Material Description	Graphic Log	USCS	Blow Count	Samples	Laboratory Test	Penetration Resistance
							0 <span style="float: right;">60</span>
1	Light brown clayey SAND, little Fine to coarse gravel (loose, dry)		SC				
2	Brown/gray sandy CLAY, little Fine to coarse gravel (soft, damp)		CL				
3	Reddish brown CLAY, little fine sand, little Medium to coarse gravel (soft, moist)		CL				
4							
5							
6							
7	Reddish brown CLAY, little fine sand, little Medium to coarse gravel (soft, wet)		CL				
8	Gray/green CLAY, little cobble, little Medium to coarse gravel (soft, wet)		CL				
9	Test pit terminated at 8.5 ft on 9/26/18						
10							
11							
12							
13							
14							

**SECTION 01 27 00  
PRICE AND PAYMENT**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. Work covered by this section includes method of measurement and basis of payment for all divisions included.
- B. All measurements and payments will be based on completed and accepted work performed in strict accordance with the drawings and specifications.
- C. Respective prices and payment shall constitute full compensation for all work completed including incidentals.
- D. Record drawings must be current and be inspected by the project engineer before progress payments will be approved.
- E. An updated project construction schedule is required before progress payments will be approved.

**PART 2 – BID SCHEDULE ITEMS**

2.01 GENERAL

- A. Payment shall be full compensation to complete the work items in good faith, including incidental work.
- B. Payment shall be full compensation for the following:
  - 1. labor
  - 2. materials
  - 3. equipment
  - 4. tools
  - 5. testing equipment
  - 6. General Requirements in Division 01.
    - a. submittals
    - b. record drawings
    - c. temporary facilities and treatments
    - d. operation and maintenance manuals
    - e. operational testing and operator training

## 2.02 BID ITEMS

### A. SCHEDULE

1. Mobilization:
  - a. Measurement: Lump Sum
  - b. Basis of Payment: Payment shall cover the cost of equipment and labor to move equipment to and from the job site. Payment shall also cover contractor expenses related to bonds, insurance, permits, coordination, and any other incidental items not otherwise paid under other bid items.
2. Temporary Erosion and Sediment Control
  - a. Measurement: Lump Sum
  - b. Basis for payment: Payment shall be full compensation for installing and maintaining erosion and sediment control measures including those identified in the contract drawings, as well as additional measures needed to prevent sediment from leaving the construction site. Preparation of a Storm Water Pollution Prevention Plan, and application for a Construction General Permit shall be incidental.
3. Embankment
  - a. Measurement: Per unit basis for each Cubic Yard of material placed in embankment, or unsuitable material excavated and removed.
  - b. Basis for Payment: Payment shall be full compensation per cubic yard to excavate, haul, place, shape, and compact soil material originating on the project site and placed in embankment; or full compensation per cubic yard of unsuitable soil material originating on the project site to excavate, haul, and remove unsuitable material from the site. Clearing and grubbing shall be incidental to this bid item.
4. Engineered Fill
  - a. Measurement: Per unit basis for each Cubic Yard of material imported and placed in embankment, measured in place.
  - b. Basis for Payment: Payment shall be full compensation per cubic yard to furnish, haul, place, shape, and compact soil material originating off-site and placed in embankment.

5. Crushed Aggregate Type 1
  - a. Measurement: Per unit basis for each Ton of material imported and placed as indicated on the contract drawings.
  - b. Basis for Payment: Payment shall be full compensation per ton to furnish, haul, place, shape, and compact aggregate material to the lines, grades, and dimensions indicated on the contract drawings.
6. Drain Rock, Crushed Aggregate for Drainage
  - a. Measurement: Per unit basis for each Ton of material imported and placed as indicated on the contract drawings.
  - b. Basis for Payment: Payment shall be full compensation per ton to furnish, haul, place, shape, and compact aggregate material to the lines, grades, and dimensions indicated on the contract drawings.
7. Flow Control Vault
  - a. Measurement: Lump Sum
  - b. Basis for Payment: Payment shall be full compensation for furnishing and installing a concrete vault, discharge flow regulator, box weir, pipes, fittings, and valves as shown on the contract drawings, and other appurtenances as needed for a complete and operable installation. Excavation and backfill will be incidental to this item.
8. Manhole
  - a. Measurement: Per unit basis for each manhole installed as indicated on the contract drawings.
  - b. Basis for Payment: Payment shall be full compensation for furnishing and installing a concrete manhole, adjustment rings, cast iron ring and cover, valves, and other appurtenances as needed for a complete and operable installation. Excavation and backfill for manhole installation shall be incidental to this bid item.
9. Drop Manhole Modification
  - a. Measurement: Lump Sum
  - b. Basis for Payment: Payment shall be full compensation for cutting and removing existing pipes, core-drilling, and installing a new drop pipe connection, sealing penetrations, and other work as indicated on

PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

the contract drawings. Excavation and backfill for manhole modification shall be incidental to this bid item.

10. Excavation, Trenching and Backfill

- a. Measurement: Per unit basis for each linear foot of trench excavated for pipe installation.
- b. Basis for Payment: Payment shall be full compensation for excavating, bedding, backfilling, and compacting trenches for pipe installation. Measurement shall be along the centerline of the pipe installed. Imported bedding material shall be incidental to this bid item. Field verification of existing utilities shall be incidental to this item.

11. PVC Sanitary Sewer Pipe, 12 In. Diam.

- a. Measurement: Per unit basis for each linear foot of pipe installed.
- b. Basis for Payment: Payment shall be full compensation to furnish and install pipe to the lines and grades indicated on the contract drawings. Trench excavation shall be paid separately. Measurement shall be along the centerline of the pipe installed.

12. PVC Sanitary Sewer Pipe, 10 In. Diam.

- a. Measurement: Per unit basis for each linear foot of pipe installed.
- b. Basis for Payment: Payment shall be full compensation to furnish and install pipe to the lines and grades indicated on the contract drawings. Trench excavation shall be paid separately. Measurement shall be along the centerline of the pipe installed.

13. PVC Sanitary Sewer Pipe, 8 In. Diam.

- c. Measurement: Per unit basis for each linear foot of pipe installed.
- d. Basis for Payment: Payment shall be full compensation to furnish and install pipe to the lines and grades indicated on the contract drawings. Trench excavation shall be paid separately. Measurement shall be along the centerline of the pipe installed.

14. PVC Force Main, 4 In. Diam.

- a. Measurement: Per unit basis for each linear foot of pipe installed.
- b. Basis for Payment: Payment shall be full compensation to furnish and install pipe to the lines and grades indicated on the contract drawings.

PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

Trench excavation shall be paid separately. Measurement shall be along the centerline of the pipe installed.

15. PVC Perforated Drain Pipe, 8 In. Diam.

- a. Measurement: Per unit basis for each linear foot of pipe installed.
- b. Basis for Payment: Payment shall be full compensation to furnish and install pipe to the lines and grades indicated on the contract drawings. Measurement shall be along the centerline of the pipe installed. Trench excavation and backfill shall be incidental to Drain Pipe.

16. PVC Perforated Drain Pipe, 4 In. Diam.

- a. Measurement: Per unit basis for each linear foot of pipe installed.
- b. Basis for Payment: Payment shall be full compensation to furnish and install pipe to the lines and grades indicated on the contract drawings. Measurement shall be along the centerline of the pipe installed. Trench excavation and backfill shall be incidental to Drain Pipe.

17. Temporary Sewage Bypass Pumping

- a. Measurement: Lump Sum
- b. Basis for Payment: Payment shall be full compensation for furnishing and maintaining temporary pumping equipment, piping, and structures to divert sewage flows around the work area as needed to complete other work.

18. Packaged Wastewater Lift Station

- a. Measurement: Lump Sum
- b. Basis for Payment: Payment shall be full compensation to furnish and install a packaged wastewater lift station, including FRP wet well, pumps, rails, discharge piping, valves, valve vault, access hatch, control panel, float switches, and other appurtenances as needed for a complete and operable installation. Excavation, bedding, backfill, and compaction will be incidental to this item.

19. 60-Mil HDPE Liner

- a. Measurement: Per unit basis for each square yard of liner installed.
- b. Basis for Payment: Payment shall be full compensation to furnish and install basin liner, anchors, pipe penetrations, vents and

## PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

appurtenances to the lines and grades indicated on the contract drawings. Material overlap at seams shall be incidental to this bid item. Testing and repair of the liner shall be incidental to this bid item.

### 20. Geotextile for Separation, 6 oz. Non-Woven

- a. Measurement: Per unit basis for each square yard of geotextile installed.
- b. Basis for Payment: Payment shall be full compensation to furnish and install geotextile to the lines and grades indicated on the contract drawings. Material overlap at seams shall be incidental to this bid item.

### 21. Chain Link Fence, Remove and Replace

- a. Measurement: Per unit basis for each linear foot of fencing that is removed and replaced.
- b. Basis for Payment: Payment shall be full compensation to disassemble existing fence, salvage and store fence materials, and reinstall fencing as allowed by work progress. Replacement of damaged fencing materials shall be incidental to this bid item.

### 22. Hydroseed

- a. Measurement: Per unit basis for each square yard of hydroseed applied within area the work area indicated on the contract drawings.
- b. Basis for Payment: Payment shall be full compensation to furnish and hydraulically apply seed and mulch as indicated on the contract drawings. Application to areas outside the indicated limits will not be paid.

### 23. General Electrical

- a. Measurement: Lump Sum
- b. Basis for Payment: Payment shall be full compensation to furnish and install conduit, conductors, junction boxes, and other appurtenances to provide electrical power and control wiring to the packaged wastewater lift station. Trench excavation, bedding, backfill, and compaction will be incidental to this item.

**END OF SECTION**

**SECTION 01 31 00  
PROJECT MANAGEMENT AND COORDINATION**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. Section includes the preconstruction conference, construction scheduling and coordination requirements.
- B. Costs associated with project management and coordination are incidental to the contract work and are included in the contract unit and lump sum costs.

1.02 PRE-CONSTRUCTION CONFERENCE AND PROGRESS MEETINGS

- A. Prior to beginning construction, but following contract award, the Contractor, Subcontractors and other interested parties must participate in a Preconstruction Conference.
- B. Periodically throughout the contract performance period, the Contractor and Subcontractors shall avail themselves to project progress meetings. These meetings shall be held as often as the parties determine is necessary, but will be at least once every other month (bimonthly).
- C. Representatives from the following shall attend each meeting:
  - 1. Prime Contractor
  - 2. Subcontractors
  - 3. Contracting Officer
  - 4. Project Engineer and Inspector
  - 5. Tribal Project Manager
- D. Contractor is responsible for notifying Subcontractors of meeting time and date.
- E. Meeting Minutes:
  - 1. Meeting Minutes will be recorded, typed up in a memorandum and distributed to all attendees by the Project Engineer.
  - 2. Any attendee may question or challenge the content of the meeting minutes, in writing to the Project Engineer, prior to the next project meeting. If the meeting minutes are unchallenged, they will be accepted as an accurate representation of the meeting discussions and decisions.
  - 3. Challenges will be resolved as “old business” at the subsequent project progress meeting.

### 1.03 CONSTRUCTION SCHEDULE

- A. Present three original signed copies to the contracting officer a written preliminary construction schedule in the form of a “critical path” diagram or equivalent chart showing the following as a minimum (all times referenced to calendar dates):
  - 1. activity
  - 2. activity description
  - 3. duration
  - 4. early start
  - 5. early finish
  - 6. latest start
  - 7. latest finish
  - 8. total float for that activity
- B. Provide enough detail to allow the Engineer to evaluate work progress both on-site and off-site.
- C. Review of the schedule by the Engineer shall not constitute endorsement of the Contractor’s approach, means, methods sequences or procedures nor shall it constitute assignment of the Contractor’s responsibility to provide superintendence and project management.
- D. Provide the Engineer with a revised schedule whenever major changes occur to the schedule.

### 1.04 WEEKLY ACTIVITY SCHEDULE

- A. Provide the Engineer with a written weekly activity schedule (facsimile or email is acceptable) indicating planned activities, locations, and approximate schedules.
- B. Note the planned visits by manufacturer’s representatives, testing firms, or other site visitors that may be of significance to the Engineer.
- C. Provide the weekly activity schedule to the engineer by noon on the last day of the workweek for activities during the following week.

**END OF SECTION**

**SECTION 01 33 00  
SUBMITTAL PROCEDURES AND REQUIREMENTS**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes information on submittal procedures and general submittal requirements. Materials requiring submittal are listed in the appropriate specification section.

1.02 SUBMITTAL PROCEDURES

- A. Submit three (3) original copies of submittals to the project engineer.
- B. Identify each cut sheet or shop drawing with the following information:
  - 1. Contract number.
  - 2. Supplier.
  - 3. Specification section, plan sheet or detail drawing number to which the submittal pertains.
- C. Submit the following information, as applicable, in accordance with the submittal requirements of each section.
  - 1. Manufacturer's cut sheets indicating compliance with references and standards (e.g. applicable ASTM, AWWA standards).
  - 2. Laboratory results, as applicable.
  - 3. Dimensional drawings or shop drawings, as applicable.
  - 4. Other specific information required by the particular section of the specification.
- D. Variations from Contract Documents or Products Specified:
  - 1. Bring all submitted variations to the attention of the Project Engineer.
  - 2. Variations not brought to the Project Engineer's attention, in writing, and that conflict with the Contract Documents, do not relieve the contractor from the requirements of the contract documents.

E. Revisions and Resubmittals:

1. Revise and resubmit submittals as required and identify all changes made since previous submittal.
2. Engineer Obligations for Resubmittals:
  - a. The engineer will be obligated to review the original submittal and one resubmittal for each item requiring submittal.
  - b. Subsequent resubmittals will be at the Contractor's expense, deducted from the subsequent partial pay request and ultimately credited to the contract via subsequent change order at an hourly rate of \$60 per hour.
3. Incomplete submittals or rejected submittals that result in the need for the Contractor to resubmit cannot be grounds for a contract time extension or equitable adjustment to contract price, unless the engineer did not meet the obligations outlined in Paragraph 1.02, Subparagraphs E and G.

F. Distribute copies of reviewed submittals to concerned parties, (i.e. suppliers, sub-contractors).

G. Submittal Time Requirements:

1. All submittals shall be made within 14 days after receipt of Notice to Proceed.
2. The Contractor should allow 10 days from receipt by the Owner for review and approval or rejection.
3. For each material re-submittal required, the Contractor should allow an additional 7 days from date of receipt by the Owner for review and approval or rejection.
4. Repeated resubmittals resulting from "Rejected" or "Incomplete Submittals" (as defined in Article 1.03) will not be grounds for a contract time extension.
5. Lack of response does not constitute approval.

H. Approval Required Before Installation:

1. Approval of submittals must be provided by the Project Engineer prior to installation of materials.

2. Materials installed without written submittal approval will be at the Contractor's risk, and may require removal, at no expense to the Owner or Government.

### 1.03 DEFINITIONS

- A. **Approved:** Deemed to be acceptable for use in accomplishing the requirements of the plans and specifications, but does not extend to the means, methods, or procedures of construction (except where specific means, methods, or procedures are specifically required by the contract documents) and does not imply approval of the system or construction in which the submitted item is a part. Approval does not relieve the Contractor of the obligation to meet the requirements of the contract documents.
- B. **Conditionally Approved:** Deemed to be acceptable for use in accomplishing the requirements of the plans and specifications, if the conditions noted in the submittal approval letter are met. The approval does not extend to the means, methods, or procedures of construction (except where specific means, methods, or procedures are specifically required by the contract documents) and does not imply approval of the system or construction in which the submitted item is a part. Conditional approval does not relieve the Contractor of the obligation to meet the requirements of the contract documents.
- C. **Rejected:** Deemed unacceptable for the use for which it was submitted.
- D. **Incomplete Submittal:** Information is insufficient to ascertain acceptability. Neither approval nor rejection is implied.

**END OF SECTION**



**SECTION 01 33 05  
CONSTRUCTION TEST RESULTS SUBMITTAL FORM**

**Contract:** \_\_\_\_\_

**Contract Number:** \_\_\_\_\_

**Contractor:** \_\_\_\_\_

Contractor's Signature

	Date	Initial
Received by COR		
Returned to Contractor		

**CONSTRUCTION TEST RESULTS REQUIRED**

Item No.	Item Description and Specification Reference	Contractor Indicate: Type, Model Number, Manufacturer, etc.	Approved/Rejected and Date

**SECTION 01 42 00  
REFERENCES**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes a list of organizations, associations or appropriate agencies with jurisdiction that have references, standards, laws or regulations cited in these specifications.
- B. Use latest revision of all references, standards, laws or regulations.

1.02 LIST OF ORGANIZATIONS, ASSOCIATIONS & AGENCIES

A. National Standards Organizations & Associations

American Association of State Highway and  
Transportation Officials (AASHTO)  
444 North Capital Street NW, Suite 249  
Washington DC, 20001  
(202) 624-5800  
[www.aashto.org](http://www.aashto.org)

American Concrete Institute (ACI)  
ACI International  
PO Box 9094  
Farmington Hills, Michigan 48333-9094  
(810) 848-3700  
[www.aci-int.org](http://www.aci-int.org)

American Society for Testing and Materials  
(ASTM)  
100 bar Harbor Drive  
West Conshohocken, Pa 19428-2959  
(610) 832-9585  
[www.astm.org](http://www.astm.org)

American Water Works Association AWWA  
6666 West Quincy Avenue  
Denver, CO 80235  
(303) 794-7711  
[www.awwa.org](http://www.awwa.org)

National Electric Code (NEC)  
National Fire and Protection Association  
1 Batterymarch Park  
Quincy, MA 02269-9959  
1 888 632-2633  
[www.nec.com](http://www.nec.com)

National Electrical Manufacturer's Association  
NEMA  
1300 North 17th Street  
Rosslyn, VA 22209  
(703) 841-3200  
[www.nema.org](http://www.nema.org)

Underwriters' Laboratories, Inc. UL  
333 Pfingston Road  
Northbrook, IL 60062  
(847) 272-8800  
[www.ul.com](http://www.ul.com)

B. Federal Agencies

Environmental Protection Agency (EPA)  
U.S. EPA Region 10  
1200 6th Avenue  
Seattle, WA 98101  
(206) 553-1200  
<http://www.epa.gov/region10>

Occupational Health and Safety Administration  
1111 Third Avenue, Suite 715  
Seattle, Washington 98101-3212  
(206) 553-5930  
(206) 553-6499 FAX  
[www.osha.gov](http://www.osha.gov)

C. State Agencies

Local Highway Technical Assistance Council  
Idaho Standards for Public Works Construction (ISPWC)  
3330 Grace Street  
Boise, ID 83703  
**Phone 208-344-0565**  
<http://lhtac.org/resources/ispwc/>

**PART 2 – PRODUCTS (N/A)**

**PART 3 – EXECUTION**

3.01 STANDARD SPECIFICATION

- A. Except as specified in these contract documents, all workmanship and materials shall be in accordance with the Idaho Standards for Public Works Construction, 2017 edition.

**END OF SECTION**

**SECTION 01 43 00  
QUALITY CONTROL/QUALITY ASSURANCE**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes prerequisites and procedures to ensure the quality of the construction and to provide assurance that the Contractor is capable of meeting quality requirements.
- B. The intent of all quality control requirements is that the Owner will be provided with a complete, properly functioning system upon completion.
- C. The costs for Contractor Quality Control/Quality Assurance measures are incidental to the overall contract and are included in the applicable contract line items.

1.02 CONTRACTOR QUALIFICATIONS

- A. The General Contractor performing work shall be registered in the State of Idaho for the type of construction and magnitude of construction being performed.

1.03 INSTALLER QUALIFICATIONS

- A. Trade work shall be performed under the direct supervision of personnel licensed in the State of Idaho for the trade being performed.

1.04 CONTROL OF INSTALLATION

- A. Inspect materials for acceptability when delivered to the site.
- B. Store and handle materials to prevent damage.
- C. Inspect materials, services, and workmanship to ensure that work is performed in accordance with the specifications.
- D. Comply with manufacturers' instructions.
- E. Should manufacturers' instructions conflict with contract documents, request clarification from Project Engineer before proceeding.
- F. Correct defective work to the satisfaction of the Project Engineer.

1.05 SAMPLES

- A. When requested by the Project Engineer, supply samples of materials proposed for use.

1.06 START-UP

- A. Prior to start-up, ensure that all equipment is ready for its use, as designed.
- B. Ensure that all power sources are balanced and ready for use.
- C. Provide the services of manufacturers' field representative for start-up, testing, and adjustment of all major equipment items.
- D. Provide reports from the manufacturer, including their observations and documentation of workmanship to the Project Engineer within 30 days of manufacturer's visit, unless a sooner response is required by the applicable specification section.
- E. Work will not be considered complete until all systems and subsystems have been tested for proper functionality and proper adjustment.

1.07 WARRANTY

- A. Provide a minimum one (1) year warranty for all materials and labor, covering defects in the materials or deficiencies resulting from contractor installation.
- B. Provide additional warranties as required by specific sections.

**END OF SECTION**

**SECTION 01 72 00  
STAKING AND CONSTRUCTION SURVEYING**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section outlines the staking and surveying work related to provide reference points in the field. The section clarifies Project Engineer responsibilities and Contractor responsibilities.

1.02 RELATED WORK

- A. Section 31 23 10 – Excavation, Trenching and Backfill
- B. Section 31 24 10 – Embankment and Engineered Fill

1.03 WORK PERFORMED BY THE ENGINEER

- A. Control Points: The Project Engineer along with representatives of the utility will identify the project control points.

1.04 CONTRACTOR'S RESPONSIBILITY

- A. Provide slope staking, grade staking, offset staking, temporary bench marks, and supplementary control points as necessary to complete the work in accordance with the plans and specifications.
- B. Request clarification from the Project Engineer regarding apparent conflicts before proceeding with installation of facilities.
- C. Preserve all control points and benchmarks placed by the Project Engineer, until such time as the pipeline and other facilities are installed. Control points and benchmarks needing replacement due to Contractor negligence to secure the site during non-construction hours or due to Contractor error shall be replaced by one of the following means:
  - 1. A professional land surveyor or engineer hired by the Contractor, or
  - 2. The Indian Health Service engineering staff, at a rate of \$900 per day (which covers salaries, vehicle costs, lodging and per diem), credited to the contract.
- D. All permanent survey points / property corner markers and bench marks not directly in the line of work shall be preserved, and permanent survey markers

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disturbed or destroyed shall be replaced, at the cost of the Contractor, by a hired Professional Land Surveyor registered in the State of Idaho. Documentation of reestablishment shall be forwarded to the Project Engineer.

**END OF SECTION**

**SECTION 01 77 00  
CLOSEOUT PROCEDURES**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. Section includes information on closeout procedures and final cleaning.

1.02 RELATED WORK

- A. Section 01 27 00 – Price and Payment
- B. Section 01 43 00 – Quality Control / Quality Assurance
- C. Section 01 78 00 – Closeout Submittals
- D. Section 01 78 05 – Operation and Maintenance Manuals

1.03 CLOSEOUT PROCEDURES

- A. Substantial Completion Process:
  - 1. Provide the engineer certification that work is substantially complete and that facilities are ready for beneficial use by the Owner.
  - 2. If the engineer concurs, the engineer will document a warranty date for substantially complete facilities.
- B. Final Inspection:
  - 1. Submit written certification that work is complete in accordance with contract documents and ready for final inspection at least five (5) calendar days prior to final inspection.
  - 2. Perform and coordinate the final inspection with the engineer, representatives of the owner and other funding partners (i.e. funding agencies) involved in the project.
  - 3. Final Punch List: Remaining deficiencies will be listed, in a written letter, from the Project Engineer.
  - 4. Provide warranties and record documents (e.g. as-built drawings) to Project Engineer within ten (10) days of final inspection.
- C. Final Completion: Final completion will be established once the final punch list deficiencies are remedied and applicable General and Contracting Requirements are met. Final completion shall be on or before the termination date defined in the Contract.

**END OF SECTION**

**SECTION 01 78 00  
CLOSEOUT SUBMITTALS**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section describes the requirements for closeout submittals including, record drawings, warranty information and general operation and maintenance information.

1.02 RELATED WORK

- A. Section 01 43 00 – Quality Control/Quality Assurance
- B. Section 01 77 00 – Closeout Procedures
- C. Section 01 78 05 – Operation and Maintenance Manuals

1.03 DELIVERY

- A. Provide all closeout submittals meeting these requirements and any specific requirements of each section.
- B. All closeout submittals must be received in a correct and complete manner before final payment can be made.

1.04 DEFINITIONS

- A. Record Drawing: A drawing showing the actual installation of facilities, showing changes from the plans, and showing detail enough that future persons can readily locate all objects.
- B. Ties: Measurements from three permanent easily located objects to an installed object.

**PART 2 – PRODUCTS (NOT APPLICABLE)**

**PART 3 - EXECUTION**

3.01 RECORD DRAWINGS

- A. Provide record data in one of the following manners:
  - 1. On a set of project drawings, neatly draw tie measurements and changes.

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2. On separate 8½ X 11 sheets, neatly draw site sketches, structure sketches, etc., indicating the necessary information.
- B. Provide three (3) swing tie measurements to all buried utility objects installed under the contract, that may need to be located in the future, including, but not limited to:
1. Gate valves
  2. Corporation stops
  3. Curb stops
  4. Water main fittings
  5. Couplings to existing water systems.
  6. Cleanouts
  7. Sewer wyes.
  8. Utility crossings.
- C. Provide offset measurements for buried utilities (e.g. water main) installed parallel to roads.
- D. Provide revised elevation data for all items that have elevations shown on the plan drawings, including, but not limited to, the following:
1. Manhole invert elevations
  2. Flow Control Vault invert elevations
  3. Lift Station invert elevations
  4. Equalization basin top of berm
  5. Equalization basin toe of berm
  6. Underdrain outlet invert elevation

### 3.02 WARRANTIES

- A. Submit all warranty information regarding the materials installed.
- B. Minimum warranty information is listed in Section 01 43 00. Specific warranties may be required for each Section of specifications.

### 3.03 OPERATION AND MAINTENANCE INFORMATION

- A. Submit Operation and Maintenance Manuals in accordance with Section 01 78 05.

**END OF SECTION**

**SECTION 01 78 05  
OPERATION AND MAINTENANCE MANUALS**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. Work under this section defines the requirements to complete an operation and maintenance manual.

1.02 RELATED WORK

- A. Section 01 77 00 – Closeout Procedures
- B. Section 01 78 00 – Closeout Submittals

**PART 2 - PRODUCTS**

2.01 OPERATION AND MAINTENANCE (O&M) MANUAL

- A. Provide three (3) electronic copies in MSWord format and three (3) copies of a bound operation and maintenance manuals for the following systems:
  - 1. Packaged Wastewater Lift Station
  - 2. Discharge Flow Regulator.
  
- B. Contents of the Facilities O&M Manual
  - 1. A Table of Contents
  - 2. Lift Station Control System:
    - a. A revised set of custom circuit drawings specific to the wastewater control system indicating any changes from the submittals.
    - b. A revised narrative description of the operation of the lift station control system indicating any changes from the submittals.
    - c. A revised enclosure dimension print indicating any changes from the submittals.
    - d. A revised layout illustration showing component locations and labels indicating any changes from the submittals.
    - e. All drawings and diagrams shall be in an 11 by 17 format developed using AutoCAD v/18 or higher.

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- f. Contact information for service technicians.
3. Maintenance manuals for all components and subcomponents integrated into the water treatment facilities system that require regular operation, trouble-shooting or maintenance, including the following at a minimum:
  - a. Control Panel
  - b. Lift Station Pumps
  - c. Lift Station Floats
4. Troubleshooting information.
5. A list of replacement parts and sources for purchasing them; including addresses, phone number and website.
6. A list of service technicians qualified to service the facilities and components of the facilities.
2. Functional descriptions of each major component, complete with operating instructions.
3. Instructions for operating pumps and controls in all modes of operation.
4. Information for calibration and adjustment of equipment for initial start-up, replacement of level control components, or as required for routine maintenance.
5. Support data for commercially available components not produced by the station manufacturer, but supplied in accordance with the specifications.
6. Electrical Schematics
  - a. Schematics shall meet the National Electric Code (NFPA 70).
  - b. Schematics shall illustrate all circuits.
  - c. Terminals and wires shall be numbered to match the facility.
  - d. Schematics shall be revised to match the actual installation.
  - e. All drawings and diagrams shall be in an 11 by 17 format developed using AutoCAD v/18 or higher.

**PART 3 – EXECUTION**

3.01 DELIVERY

- A. Provide the Project Engineer with draft copies of the O&M Manuals for review prior to substantial completion of the facilities.
- B. Allow the Project Engineer 21 calendar days for review and comment.
- C. Revise and submit final O&M Manuals prior to closeout (Section 01 78 00).

3.02 TRAINING

- A. Orient the Owner's utility operator to the contents of the O&M manual in conjunction with training.
- B. Contractor shall provide no less than 4 hours of training to Owner's utility operator for use and maintenance of all the installed components and equipment.

**END OF SECTION**

# **PART 6**

## **CIVIL TECHNICAL SPECIFICATIONS**

**SECTION 03 30 00  
CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes provisions for cast-in-place concrete used for concrete pads, thrust blocking, and other locations as identified on the plans.

1.02 RELATED WORK

- A. Section 31 23 10 – Excavation, Trenching, and Backfill
- B. Section 33 31 25 – Wastewater Force Main Piping
- C. Section 33 38 10 – Basin Liner

1.03 REFERENCES

- A. ASTM C33 – Standard Specification for Concrete Aggregates.
- B. ASTM C94 – Standard Specification for Ready Mix Concrete.
- C. ASTM C150 – Standard Specification for Portland Cement.
- D. ASTM A185 – Welded Steel Wire Fabric, Plain for Concrete Reinforcement
- E. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

1.04 QUALITY ASSURANCE

- A. Obtain cement and aggregate from the same source for all work.

**PART 2 - PRODUCTS**

2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150, Portland Cement Type – IA, Air Entrained.
- B. Aggregates: ASTM C33.
  - 1. Fine Aggregates:
    - a. Fine aggregates shall be clean, hard, tough, water sound and free of deleterious substances.
    - b. One hundred percent passing 3/8 inch sieve.

- c. At least fifty percent passing No. 16 sieve.
- 2. Coarse Aggregates
  - a. Coarse aggregates shall be clean, hard, tough, water sound and free of deleterious substances.
  - b. Maximum aggregate size for reinforced concrete shall not be larger than  $1/5$  of the narrowest dimension between forms, nor larger than  $3/4$  of the minimum clear spacing between reinforcing bars or between bars and forms.
  - c. Maximum aggregate size for unreinforced slabs shall not be larger than  $1/3$  the slab thickness or 2 inches, whichever is smaller.
- C. Mixing Water
  - 1. Use potable water unless approved by Project Engineer.
- D. Material Storage
  - 1. Store materials in such a manner as to prevent deterioration or intrusion of foreign matter.

## 2.02 METAL REINFORCEMENT

- A. Rebar: Conforming to ASTM A615
- B. Welded Wire Fabric: Conform to ASTM A185

## 2.03 CONTROLLED DENSITY FILL (CDF)

- A. Controlled Density Fill shall be a flowable fill or cementitious slurry with a 28-day compressive strength of no less than 300 psi.

# **PART 3 - EXECUTION**

## 3.01 PLACING CONCRETE

- A. Concrete shall not be placed when atmospheric temperature is below 40 degrees Fahrenheit unless authorized in writing by the Project Engineer.
- B. Forms shall conform to shapes, lines and dimensions of members as called for on the plans and shall be sufficiently tight to prevent leakage of mortar.
  - 1. Properly brace and tie forms together to maintain position and shape and prevent leakage.

- C. Remove water from place of deposit before concrete is placed.
- D. Moisten subgrade at the time the concrete is deposited.
- E. Deliver and mix Ready-Mixed Concrete in accordance with ASTM C94.
- F. Access to the mixing plant shall be provided to the Project Engineer.
- G. Tickets indicating time of adding initial mixing water may be required by the Project Engineer.
- H. Place concrete in one continuous operation, once placing is started.
- I. Remove supporting forms and shoring after members have acquired sufficient strength to support their weight and imposed loads safely.
- J. If concrete placement is authorized for atmospheric temperatures at or below 40 degrees Fahrenheit, concrete temperature shall not be less than 45 degrees Fahrenheit at the time of placement.
  - 1. Heating procedures that alter or prevent the entrainment of the required amount of air in the concrete will not be permitted.
  - 2. Do not heat aggregates and water used for mixing to a temperature exceeding 120 degrees Fahrenheit.
- K. Air temperatures surrounding concrete shall be maintained at a temperature of not less than 45 degrees Fahrenheit, nor more than 70 degrees Fahrenheit, for a period of four days.
  - 1. Following the four-day period, the concrete shall be protected from air temperatures below 35 degrees Fahrenheit, for an additional four-day period.
- L. Consolidate concrete with vibrators transmitting no less than 5,000 impulses per minute.
- M. Chemical or other foreign material shall not be added to the concrete.

### 3.02 FINISHING

- A. Concrete slab work shall be finished with a smooth troweled surface.

3.03 FIELD QUALITY CONTROL

- A. Concrete shall have a compressive strength of 4000 psi at 28 days.
- B. Controlled Density Fill (CDF) shall have a compressive strength of 300 psi at 28 days.
- C. The Project Engineer may require slump and compression tests.

**END OF SECTION**

**SECTION 31 05 15  
BASIC SITE SOILS AND AGGREGATES**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section describes the basic soil and aggregate materials for the job and lists their general uses. Additional requirements for placement, compaction, and testing are given in subsequent sections.

1.02 RELATED WORK

- A. Section 31 11 00 – Clearing and Grubbing
- B. Section 31 23 10 – Excavation, Trenching, and Backfill

1.03 SUBMITTALS

- A. Supplier and gradation for the following materials:
  - 1. Top Soil
  - 2. Engineered Fill
  - 3. Crushed Aggregate Type 1
  - 4. Pipe Bedding
  - 5. Drain Rock

**PART 2 – PRODUCTS**

2.01 Native Materials

- A. Top Soil
  - 1. Excavated material, up to 18 inches below stripped surface, free of rocks larger than 3 inches, roots, refuse, brush, or other debris.
- B. Native Fill
  - 1. Material generated from construction site excavations
    - a. General soil types:

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(1) Coarse Sand

(2) Clayey Sand

2. Used to bring the site to its finished subgrade
3. Not used when:
  - a. Material cannot meet compaction requirements.
  - b. Moisture content exceeds 3% of the optimum content.
  - c. Fill placed beneath structures.
4. Waste excess native fill in designated “embankment” areas and stabilize, or haul to approved disposal area.

2.02 Imported Materials and Aggregates

A. Engineered Fill

1. Soil material which fits the USCS soil texture Class GW, GP, GM, GC, SW, SP, SM, SC, or ML; is free of rocks larger than 4 inches, roots, refuse, brush, or other debris; is non-plastic, and is capable of meeting compaction requirements.
2. Basic Gradation:

<b>Sieve Size</b>	<b>% Passing</b>
4" Square	100
U.S. No. 40	50% Maximum
U.S. No. 200	10% Maximum

3. Gravel Fill Gradation:

<b>Sieve Size</b>	<b>% Passing</b>
4" Square	100
U.S. No. 4	50% -80%
U.S. No. 40	30% Maximum
U.S. No. 200	7% Maximum

4. General Uses:
  - a. Compacted fill for earthen structures (basin dike) to bring to finished grade.

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- b. Gravel Fill is for backfilling holes excavated to remove unsuitable and soft soils.

B. Crushed Aggregate Type 1

- 1. Meets ISPWC Section 802 Part 2.2
- 2. Basic Gradation:

<b>Sieve Size</b>	<b>% Passing</b>
1" Square	100
3/4" Square	90-100
U.S. No. 4	40-65
U.S. No. 8	30-50
U.S. No. 200	3-9

3. General Uses

- a. Surface stabilization (roads and staging areas)
- b. Compacted fill beneath major structures (manholes, vaults, lift station)

C. Pipe Bedding

- 1. Meets ISPWC Section 305 Part 2.2
- 2. Basic Gradation:

<b>Sieve Size</b>	<b>% Passing</b>
1" Square	100
3/4" Square	80-100
3/8" Square	20-70
U.S. No. 4	5-20
U.S. No. 8	0-5
U.S. No. 200	0-3

3. General Uses

- a. Fill in the pipe embedment zone

D. Drain Rock, Crushed Aggregate for Drainage

1. Meets AASHTO No. 57 Coarse Aggregate

2. Basic Gradation:

<b>Sieve Size</b>	<b>% Passing</b>
1 ½" Square	100
1" Square	95-100
½" Square	25-60
U.S. No. 4	0-10
U.S. No. 8	0-5

3. General Uses:

a. Lagoon liner underdrain

**PART 3 – EXECUTION**

3.01 Covered in subsequent sections.

**END OF SECTION**

**SECTION 31 11 00  
CLEARING AND GRUBBING**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section describes the clearing, grubbing and other removal of vegetative material requirements.

**PART 2 – PRODUCTS (NOT APPLICABLE)**

**PART 3 - EXECUTION**

3.01 CLEARING AND GRUBBING

- A. Contractor shall clear, grub, and clean up the areas where excavation will occur, and within the project limits.
  - a. ISPWC reference Section 201.
- B. Clear and Grub to limits shown on plans, or as described below:
  - a. 5 feet on either side of excavated pipe trenches
  - b. 5 feet from the edge of excavation or embankment
- C. Clearing shall include removing and disposing of all unwanted material from the surface including trees, brush, down timber, and other natural material.
- D. Fell trees only within the area to be cleared.
- E. Grub shall include removal of all stumps, large roots, buried logs, and other woody material.

3.02 DISPOSAL METHODS

- A. Disposal Method #1: The Contractor may elect to haul woody vegetative material to a waste site obtained by the Contractor or at a site explicitly identified by the contract documents.

B. Disposal Method #2: Chipping

1. Chip into pieces no larger than 6 square inches and 1/2" thickness.
2. Spread chipped wood evenly across the site, away from excavation.

**END OF SECTION**

**SECTION 31 22 10  
SITE GRADING**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes rough and finished site grading of all areas disturbed during construction.

1.02 RELATED WORK

- A. Section 31 23 10 – Excavation, Trenching and Backfill
- B. Section 31 25 00 – Erosion and Sediment Control
- C. Section 32 90 20 – Topsoil, Seed, Fertilize and Mulch

**PART 2 – PRODUCTS (Not applicable)**

**PART 3 - EXECUTION**

3.01 ROUGH GRADING

- A. Grade the area in the vicinity of the excavation to prevent surface water from flowing into the excavation.

3.02 FINISH GRADING

- A. Grade site to true grades and contours as specified on the plans after all structures and piping have been installed.
- B. Grade sites for effective drainage away from structures.
- C. Dress and trim all slopes.
- D. Round off the tops of slopes and toes of slopes.
- E. Reseed slopes as soon as possible in accordance with Section 32 90 20 – Topsoil, Seed, Fertilize and Mulch.

**END OF SECTION**

**SECTION 31 23 10  
EXCAVATION, TRENCHING AND BACKFILL**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes excavation, trenching and backfill necessary for the construction of the facilities as indicated on the plans including, but not limited to gravity sewer mains, sewer force mains, underdrain piping, and conduit.

1.02 RELATED WORK

- A. Section 31 22 10 – Site Grading
- B. Section 31 25 00 – Erosion And Sediment Control
- C. Section 33 31 13 – Sanitary Sewer
- D. Section 33 31 25 – Wastewater Force Main Piping

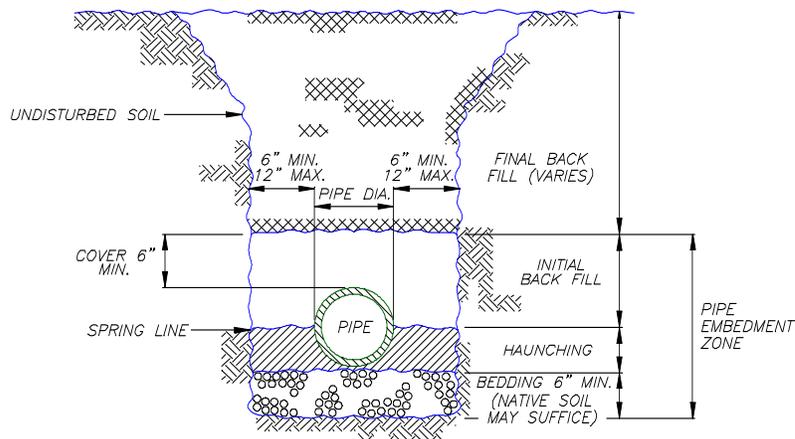
1.03 REFERENCES

- A. ASTM D698 – Test Methods for Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. Rammer and 12-in. Drop [Standard Proctor Test].
- B. ASTM D1556 – Test Method for Density of Soil in Place by the Sand-Cone Method
- C. ASTM D2216 – Test Method for Laboratory Determination of Water Content of Soil, Rock and Soil-Aggregate Mixtures
- D. ASTM D2487 – Classification of Soils for Engineering Purposes [Unified Soil Classification System].
- E. ASTM D2774 – Underground Installation of Thermoplastic Pressure Piping
- F. ASTM D2922 – Test Method for Density of Soil and Soil Aggregate and Rock in Place by Nuclear Methods (Shallow Depth)
- G. ASTM D3017 – Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- H. OSHA 1926 – Occupational Safety and Health Standards for the Construction Industry
- I. ISPWC – Idaho Standard for Public Works Construction, 2017 Edition

1.04 DEFINITIONS

- A. Bedding, Haunching and Initial Backfill zones as defined herein and on the standard thermoplastic pipe trench detailed drawing below.

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B. Native, Import and Select Material Definitions:

1. Native Material: Soils excavated from the trench in the immediate vicinity of current pipe installation activities.
2. Import Material: Soils transported from a soil pit stockpile at a location other than the location where trench excavation is taking place.

C. Soil Materials as summarized in the table below and further defined in ASTM D2487:

<i>USCS Group</i>	<i>Description</i>
GW	Well-Graded Gravel, with less than 5% fines
GP	Poorly-Graded Gravel, with less than 5% fines
SW	Well-Graded Sands, with less than 5% fines
SP	Poorly-Graded Sands, with less than 5% fines
GW-GM or GW-GC	Well-Graded Gravel, with 5-12% fines
GP-GM or GP-GC	Poorly-Graded Gravel, with 5-12% fines
SW-SM or SW-SC	Well Graded Sands with 5-12% fines
SP-SM or SP-SC	Poorly Graded Sands with 5-12% fines

1.05 SUBMITTALS

- A. Submit the result of standard proctors, including proctor curve, for each soil type encountered and used on the job.
- B. Submit all compaction test results in writing within 5 days of being performed.

1.06 QUALITY ASSURANCE

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- A. **Compaction Testing Qualifications:** Tests must be performed by a firm or professional regularly engaged in soil testing for engineering purposes. The individual on site shall be certified to operate nuclear density equipment.
- B. **Locations:** Provide compaction test results at locations as designated by the Project Engineer.
  - 1. **Frequency:**
    - a. **Excavation, Trenching and Backfilling outside of an Established, Traveled Roadway:** once per 500-feet along the pipeline.
  - 2. At locations where structures, roadway shoulders, or driveways will be constructed or reconstructed over the trench, the backfill shall be spread in layers and be compacted by mechanical tampers. In such cases, the backfill material shall be placed in successive layers not exceeding 6 inches in loose thickness, and each layer shall be compacted with mechanical tampers to the density specified herein. Mechanical tampers shall be of the impact type as approved by the Engineer.
  - 3. At each location, provide enough tests to demonstrate compliance with the compaction requirements for both the pipe embedment zone and the final backfill zone.
  - 4. If testing reveals inadequate compaction, retest at that location after remedying the non-compliance with the specifications.

## **PART 2 – PRODUCTS**

### 2.01 BEDDING, HAUNCHING AND INITIAL BACKFILL MATERIAL

- A. **Imported Bedding, Haunching and Initial Backfill Materials:** Use one of the following materials.
  - 1. Crushed, processed or naturally occurring aggregates that meet ISPWC Section 305, “Type1 Bedding”:
  - 2. USCS (ASTM D2487) soil types GP, GW, SP, SW (coarse grained soils with less than 5% fines) and GP-GM, GP-GC, GW-GM, GW-GC, SP-SM, SP-SC, SW-SM, SW-SC, with maximum particle sizes limited to 1-inch, utilized as stipulated in Part 3 - Execution.
- B. **Native bedding, native haunching and native initial backfill material:**
  - 1. Use in accordance with the restrictions of Part 3 – Execution.

2. Free from particles greater than 1-inch in dimension.

## 2.02 FINAL BACKFILL MATERIAL

### A. General:

1. Free from soil chunks larger than 4-inches in dimension.
2. Free from stones or rocks larger than 4-inches in dimension.
3. Free from organic materials.
4. Free from frost chunks.

### B. Imported Final Backfill for Wet Conditions:

1. Types GW, GP, SW, SP (coarse grained soils with less than 5% fines) or GW-GC/GM, GP-GC/GM, SW-SC/SM, SP-SC/SM (coarse grained soils with 5-12% fines).
2. Otherwise meeting the general requirements of Article 2.02 Paragraph A.

## **PART 3 - EXECUTION**

### 3.01 GENERAL

- A. Conform to applicable safety laws, including, but not limited to, OSHA 29 CFR Part 1926.
- B. Obtain all permits from the appropriate road agencies for construction within road right of way.
- C. Repair damage resulting from settlement, slides, cave-ins, water pressure, and other causes.
- D. Provide traffic control and other temporary provisions as needed.

### 3.02 EXCAVATION

- A. Remove brush, trees and stumps from excavation and site.
- B. Strip and stockpile existing topsoil.
- C. Maintain surface drainage away from trenching or excavation.
- D. If existing soil cannot provide uniform and stable bearing support along the length of the pipe, or if the existing soil contains stones greater than 1-inch in dimension, then over-excavate 6-inches below bottom of pipe.

### 3.03 TRENCHING

- A. Total Bottom Width:

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1. Minimum: Pipe diameter plus 8-inches.
  2. Maximum: Pipe diameter plus 16-inches.
- B. Depth: Provide minimum cover as specified, or depths shown on plans.
- C. Top Width: As needed to meet safety requirements, but minimize the width where possible.
- D. Trench Walls: Keep trench walls vertical in the pipe embedment zone.
- E. Length of Open Trench:
1. Unless authorized by the Project Engineer in writing, the length of trench excavation in advance of pipe being laid shall not exceed 300-feet during active construction.
  2. All trenches must be backfilled during non-work hours, or alternately, up to 20-feet of trench can be left open during non-work hours if the trench is completely barricaded and fenced.
  3. If open trenches in excess of this specification result in the wetting of moisture-sensitive stockpiled materials, such that the moisture content makes it impossible to meet compaction requirements, the contractor shall provide imported material that complies with these specifications and haul away the wet materials at no expense to the project or the Owner.

3.04 BEDDING

- A. General:
1. Where over excavation is necessary, install 6-inches of Imported Bedding.
  2. Level and form the bottom of the trench to provide uniform bearing support along the length of the pipe.
- B. Compaction of Imported Bedding: Meet the following density requirements based on standard proctor (ASTM D698):

<i>Location</i>	<i>Percent of Max. Dry Density Required</i>
Areas of Recent Fill or Embankment	95%
Areas Traveled By Vehicular Traffic, Rights-of-Way	90%

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Unimproved Surfaces or Fields	80%
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3.05 HAUNCHING AND INITIAL BACKFILL

A. General

1. Provide complete and uniform bearing and support for the pipe, including allowance for bell holes.
2. Work material under the pipe haunches and around the pipe to ensure full pipe support.
3. Place material in lifts no greater than 6-inches thickness in loose measure.
4. Install initial backfill to a depth of 6-inches over the crown of the pipe.

B. Material Usage:

1. Plastic Pipe: Imported Material

C. Compaction of Haunching and Initial Backfill:

1. Compact haunching material and initial backfill using walk-behind vibratory plate compactor or manual hand-tamping tools
2. Ensure no contact between compacting equipment and the pipe.
3. Prohibited Compaction Equipment for Haunching and Initial Backfill:
  - a. hoe-pack
  - b. hydrohammer
  - c. rammer-tamper
  - d. vibratory rollers
4. Prevent movement of the pipe during placement or compaction of material.
5. Meet the following density requirements based on standard proctor (ASTM D698):

<i>Location</i>	<i>Percent of Max. Dry Density Required</i>
Areas of Recent Fill or Embankment	95%
Areas Traveled By Vehicular Traffic, Rights-of-Way	90%
Unimproved Surfaces or Fields	80%

3.06 FINAL BACKFILL

A. General:

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1. If moisture content of the native soil results in the inability to meet compaction requirements (due to fines), use imported material that meets Article 2.02 B.
2. Waste or haul away material not meeting the requirements.
3. Repair any trenches improperly backfilled or where settlement occurs, then refill and compact.

### B. Compaction:

1. Install 2-feet of total fill over the pipe crown before subjecting the trench to hydrohammers, hoe-packs, or vehicular traffic.
2. Backfill in lifts to meet compaction requirements throughout the full depth of backfilled trench.
3. Compact to the following requirements (Densities as a percent of Standard Proctor):

<i>Location</i>	<i>Maximum Lift</i>	<i>Percent of Max. Dry Density Required</i>
Under Roadways or Surfaces Traveled by Vehicular Traffic	12-inches	95%
Areas of Recent Fill or Embankment	12-inches	95%
Rights-of-Way	12-inches	90%
Unimproved Surfaces or Fields	24-inches	70%

4. Use smaller lifts if necessary to meet the in-place density requirements.

### 3.07 REMOVAL OF NUISANCE WATER

- A. Control site drainage, springs and runoff, and prevent water from adversely affecting trenching locations.
- B. Remove nuisance water entering the trenches. Water that can be removed through the use of sump or trash pumps will not be considered dewatering.
- C. Keep trenches free from standing water until the facilities are in place, the end plugged against the entrance of water, and backfill has been placed and compacted.

### 3.08 LOCATE EXISTING UTILITIES

- A. Field locate all existing underground utilities.
  - 1. Utilize state “utility locate” hotlines.
  - 2. Contact all other utility owners not covered by the state “Utility Locate” hotlines.
- B. Contact tribal water and sewer officials 48-hours in advance of work in areas needing utility location service.

### 3.09 UTILITY CONFLICTS

- A. Protect existing utilities from damage during excavation and backfilling operations.
- B. Provide temporary support for existing water, gas, telephone, power, or other utility services that cross the trench until backfilling of trench is complete.
  - 1. Compact backfill to 95% of maximum density under disturbed utilities.
  - 2. Coordinate the repair of existing utilities, regardless of whether they were properly located.
    - a. Damage to existing utilities properly located through “Utility Locate” programs will be the responsibility of the Contractor to repair, at no cost to the Owner or Government.
    - b. Damage to existing utilities improperly located by “Utility Locate” programs shall be at the expense of the “Utility Locate” service or the owner of the damaged utilities.
    - c. Fair compensation will be negotiated for repairs to tribal water and sewer utilities that were improperly located. However, if the Contractor neglects to request a Tribal utility locate in accordance with the Contract requirements, no compensation will be made to the Contractor.
- C. Water and sewer parallel and perpendicular crossings:
  - 1. Maintain a 10-foot horizontal separation (O.D. to O.D.) for parallel mains.
  - 2. Upon approval by the Engineer, water and sewer mains may be installed in parallel as close as 6-feet, provided all of the following conditions:
    - a. Vertical separation is 18 inches (O.D. to O.D.)

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- b. Water main is above the sewer main.
  - c. Sewer pipe is constructed to withstand 150 psi static pressure without leaking.
3. Maintain a minimum 18-inch vertical separation (O.D. to O.D.) for perpendicularly crossing mains.
- a. Place water pipe over sewer pipe.
  - b. Lay pipe with joints equidistant from the point of crossing.
4. If it is impossible to meet any of the above separation distances and deviations, and specific provisions are not indicated on the plans, bring the matter to the attention of the Project Engineer for resolution.

**END OF SECTION**

**SECTION 31 24 10  
EMBANKMENT AND ENGINEERED FILL**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section addresses the material requirements and requirements for placement and compaction for both on-site fill and imported fill.
- B. This section addresses fill for embankments and general earthwork.

1.02 REFERENCES

- A. ASTM C136 – Method for Sieve Analysis of Fine and Coarse Aggregates
- B. ASTM D698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf / ft<sup>3</sup>)
- C. ASTM D1556 – Test Method for Density of Soil in Place by the Sand-Cone Method
- D. ASTM D2216 – Test Method for Laboratory Determination of Water Content of Soil, Rock and Soil-Aggregate Mixtures
- E. ASTM D2922 – Test Method for Density of Soil and Soil Aggregate and Rock in Place by Nuclear Methods (Shallow Depth)
- F. ASTM D3017 – Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- G. AASHTO T 310 – Standard Method of Test for In-Place Density and Moisture Content of Soil and Soil Aggregate by nuclear Methods

1.03 SUBMITTALS

- A. 13 lb Sample and gradation of imported fill materials.
- B. Proctor curve with maximum density and optimum moisture content indicated.
- C. Field density and moisture test results.

## 1.04 DEFINITIONS

- A. Excavation: Excavation, removal, hauling and compaction of soil materials originating on the project site to the lines, grades, and dimensions indicated on the contract drawings. Excavation and removal of unsuitable soils is paid under Embankment. All other excavation is incidental to other work.
- B. Embankment: Placement of excavated materials to the lines, grades, and dimensions indicated on the contract drawings, including haul, compaction, shaping, and grading of fill material.
- B. Engineered Fill: Imported borrow or fill material, meeting material requirements, and placed to the lines, grades, and dimensions indicated on the contract drawings, including haul, compaction, shaping, and grading of fill material.

## PART 2 - PRODUCTS

### 2.01 GENERAL MATERIAL REQUIREMENTS

- A. Free from roots, debris, large stones, organic and other deleterious materials.
- B. Limit the maximum particle size to 2/3 of the layer being placed.
- C. Material must be non-plastic, such that the soil fraction passing the number 40 sieve cannot be rolled into an 1/8-inch thread as determined by AASHTO Standard Test Designation T90.

### 2.02 ENGINEERED FILL REQUIREMENTS

- A. Imported Fill Material:

<u>Sieve Size</u>	<u>Percent Passing</u>
4" Square	100%
U.S. No. 40	50% maximum
U.S. No. 200	10% maximum

- B. Imported Gravel Material:

<u>Sieve Size</u>	<u>Percent Passing</u>
4" Square	100%
U.S. No. 4	50% - 80%
U.S. No. 40	30% maximum
U.S. No. 200	7% maximum

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Clear and grub as specified.
- B. Strip and stockpile topsoil and/or organic material.
- C. Scarify the area onto which the fill is being placed to a depth of 6-inches.
- D. Compact subgrade to density requirements for subsequent embankment materials. Scarify, adjust moisture content, and recompact, if necessary, to achieve densities.
- E. Excavate and remove soft areas of subgrade not capable of in-situ compaction. Backfill with imported gravel material and compact to density equal to or greater than requirements for subsequent embankment materials. Limits of unsuitable material must be approved by engineer prior to excavation.
- F. Backfill all holes with imported fill, whether caused by stripping or otherwise, to the existing ground surface prior to commencement of filling activities.
- G. Prior to placement of any fill material, compact subgrade to the density requirements in Section 3.02.

### **3.02 PLACEMENT AND COMPACTION**

- A. Construct fills and embankments at the locations and to the lines, grades and/or typical sections indicated on the plans.
- B. Lift (layer) Thickness:
  - 1. Top 2-feet of Fill: 4-inches maximum (before compaction)
  - 2. Below the Top 2-feet of Fill:
    - a. 18-inches (before compaction) if the specified density can be achieved throughout the thickness of the layer and if vibratory compaction equipment is used.
    - b. 8-inches (before compaction) if the specified density cannot be achieved throughout the thickness of the layer.
- C. Required Densities:
  - 1. Top 2-feet of Fill: 95% of Maximum Density

2. Below the Top 2-feet of Fill: 90% of the Maximum Density

D. Moisture Content Limitations:

1. Maximum: 3% in excess of the optimum determined by laboratory moisture-density tests (i.e. proctor tests), unless the material is free draining gravel or sand with less than 5% fines (passing No. 200 sieve) or if the moisture will not impair the embankment's integrity and soil density.
2. Minimum: As necessary to meet the required density.
3. Moistening, drying or protecting the moisture content shall be incidental to the work, and the cost of such activity shall be included in the bids.

### 3.03 TESTING AND REPORTING REQUIREMENTS

A. Establishing Maximum Density Values:

1. Proctor Tests: When soils have 30% or less by mass retained on the  $\frac{3}{4}$ -inch (19.0-mm) sieve, use the standard proctor test (ASTM D698 or AASHTO T99).
2. Alternate Procedure: When soils have greater than 30% by mass of the particles retained on the  $\frac{3}{4}$ -inch (19.0-mm) sieve, use the Idaho IT-74 Test Method.
3. Frequency: Provide laboratory results for maximum density and optimum moisture for every 4,000 cubic yards of fill (on-site fill or imported fill) or for every change of borrow pit, whichever is more frequent.

B. Gradation Analyses: Provide gradation analyses, in accordance with ASTM C136, for every 2,000 cubic yards of fill (on-site fill or imported fill) or for every change of borrow pit, whichever is more frequent.

C. Field Density and Moisture Tests:

1. Method: Test using Nuclear Field Density methods, according to ASTM D2922 and D3017, or by the sand cone method, ASTM D1556.
2. Frequency and Location: Test in locations as requested by the Project Engineer. Approximate frequency will be as follows:
  - a. Imported Fill: 1 per 500 cubic yards, minimum.
  - b. Native Fill: 1 per 500 cubic yards, minimum.
3. Perform the field density tests at the time of placement of material. If the testing equipment or testing firm is unavailable, leave the area exposed for testing until such time as the test is performed.

4. If a test reveals inadequate compaction, the contractor shall remedy the compaction deficiency and provide additional tests to show compliance. The costs of additional tests shall be the contractor's responsibility.
  5. Reporting: Supply the results of the field density and field moisture tests to the Project Engineer within 5-days of the work at the location of the test.
- D. Access to Work and Materials: Allow access to materials and to work for the purposes of testing and determining compliance with the fill placement requirements, and make provisions in bids to allow for such activities.

**END OF SECTION**

**SECTION 31 25 00  
EROSION AND SEDIMENT CONTROL**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes erosion and siltation control measures accomplished through the use of interception embankments, berms, dikes, dams, silt fences, settling basins, slope paving, ditch checks, rip-rap, mulches, erosion mats, and other erosion control devices or methods.

1.02 RELATED WORK

- A. Section 31 22 10 – Site Grading
- B. Section 31 23 10 – Excavation, Trenching and Backfill
- C. Section 32 90 20 – Seed, Fertilize and Mulch

1.03 REFERENCES

- A. Environmental Protection Agency - 1987 Congressional Amendments, Clean Water Act, Section 402.
- B. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices.

1.04 SUBMITTALS

- A. Storm Water Pollution Prevention Plan (SWPPP)
- B. Notice of Intent (NOI) for coverage under the EPA Construction General Permit
- C. Silt fence material, (or alternate erosion control material proposed).

1.05 QUALITY ASSURANCE

- A. Erosion control materials, methods and practices shall conform to the applicable state agency handbooks of Best Management Practices, or tribal laws established for the purpose of erosion control on construction sites.

**PART 2 - PRODUCTS**

2.01 POSTS

- A. Wood or steel, 2" x 2" x 54" minimum.

2.02 SILT FENCING

- A. 15 mil thick screen fabric with a minimum of 120 pounds of grab tensile strength and an equivalent minimum opening size of 170.
- B. All seams shall be heat sealed or sewn

2.03 EROSION FIBER LOGS

- A. Made of aspen excelsior barbed, curled wooden fibers inside a tube of polyester netting.
- B. Acceptable Products: Equal to American Excelsior Sediment Log

2.04 GEOTEXTILE FABRIC

- A. Woven Polypropylene Geotextile
- B. Acceptable Products: Equal to Mirafi 500X

2.05 AGGREGATE FOR STABILIZATION

- A. ISPWC Section 801 "Drain Rock 3 Inches"

<u>Sieve Size</u>	<u>Percent Passing</u>
3"	99-100%
1"	25-60%
3/8"	0- 4%
No. 200	0-2%

2.06 QUARRY SPALLS

- A. ISPWC Section 801 "Uncrushed Aggregate 8 Inch".

<u>Sieve Size</u>	<u>Percent Passing</u>
8"	100%
No. 4	25-60%
No. 200	0-12%

**PART 3 – EXECUTION**

3.01 GENERAL

- A. Coordinate temporary and permanent erosion control measures to ensure economical, effective and continuous erosion control.

- B. Keep construction areas small.
- C. Divert drainage away from construction areas.
- D. Prevent discharge or deposition of soil materials into surface waters.
- E. Inspect and maintain temporary erosion control materials to ensure its continued effectiveness.
  - 1. Remove sediment material captured by erosion control systems before the systems fail.
  - 2. Inspect and repair erosion control systems following rain events.
- F. Remove erosion control only after the area has stabilized and vegetation has developed to the extent that further erosion is unlikely.
- G. Submit an erosion control plan in accordance with local Tribal requirements, State BMP's and Federal EPA requirements.

### 3.02 TEMPORARY EROSION CONTROL

- A. Use temporary erosion control measures to protect ditches and drainage ways.
- B. Silt fencing (in lieu of or in combination with erosion bales)
  - 1. Place silt fences following a constant elevation contour, in an arc or horseshoe shape with the ends pointing up towards the slope.
  - 2. Drive stakes into the soil to a depth such that the silt fence contacts the ground.
  - 3. Trench the silt fence into the ground and tamp the bottom of the filter material to ensure that runoff is forced through the fence rather than under it.
- C. Erosion Control Fiber Logs (in lieu of or in combination with other methods)
  - 1. Install as necessary or as otherwise indicated on the plans.
  - 2. Place perpendicular to the direction of flow in a drainage swale or ditch.
  - 3. Butt ends of logs up against each other and secure using nylon zip ties.
  - 4. Place hardwood stakes every 2-feet along the downstream side of the erosion log and secure the log to the stakes.
  - 5. Ensure that the installation is installed flush with the ground so that runoff is forced through the erosion log rather than over it.

### 3.03 PERMANENT EROSION CONTROL

A. Quarry Spall Dams:

1. In ditches with grades greater than 2%, install quarry spall dams once every 50-feet.
2. Create a dam with a height of 1-foot, across the width of the ditch.
3. Place geotextile between the quarry spalls and the subgrade.

B. Stabilize areas adjacent to drainageways where culverts are being installed using geotextile and quarry spalls.

**END OF SECTION**

**SECTION 32 31 13  
CHAIN LINK FENCE AND GATE**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. Work includes the removal, salvage, storage, and re-installation of a fencing system including the following:
  - 1. Chain link fence fabric
  - 2. Framework and fittings
  - 3. Installation requirements
- B. Remove sections of fence as needed to accommodate excavation and pipe installation. Reinstall fencing as work progress allows.
- C. Replace fencing components as needed to restore the fence to a condition equivalent or better than original.

1.02 RELATED WORK

- A. Section 03 30 00 – Cast-In-Place Concrete

1.03 SUBMITTALS

- A. Plan Layout
- B. Component Spacing
- C. Steel Posts
- D. Fence Fabric
- E. Barbed and Razor Wire
- F. Fittings and Accessories
- G. Vehicle Gate

1.04 WARRANTY

- A. Provide a one (1) year warranty that the installation will meet these specifications, and that the Contractor will repair or reinstall fence, at the Contractor's expense, for defects due to the Contractor's installation methods.

## 1.05 CLEANUP

- A. Remove all extraneous materials, shipping containers, wire cuttings and extra fence from the site after the installation is complete.
- B. Grade the areas disturbed by the fence installation.

## **PART 2 - PRODUCTS**

### 2.01 POSTS, RAILS AND BRACES

- A. Terminal Posts (Corner Posts): 2-7/8" hot-dipped galvanized Sch 40 steel
- B. Line Posts: 2-3/8" hot-dipped galvanized Sch 40 steel
- C. Gate Posts: 4-inch hot-dipped galvanized Sch 40 steel
- D. Braces: 1-5/8" hot-dipped galvanized Sch 40 steel
- E. Top Rail: 1-5/8" hot-dipped galvanized Sch 40 steel
- F. Gate Frame: 1-7/8" hot-dipped galvanized Sch 40 steel
- G. Reference: Fence framework shall conform to ASTM F1043

### 2.02 CHAIN LINK FABRIC

- A. Hot-Dipped Galvanized
- B. Gauge: 9

### 2.03 TENSION WIRES, BARS, BAND, ATTACHMENTS AND FITTINGS

- A. Bottom Tension Wire: 7-gauge spring coil
- B. Brace and Tension Bands: 1/8" x 1" galvanized steel
- C. Tension (Stretcher) Bars: 3/16" x 3/4" hot-dipped galvanized steel
- D. Diagonal Truss Rod: 3/8" hot-dipped galvanized steel
- D. Rail Ends, Caps and Fittings: hot-dipped galvanized steel

- E. Top Rail and Post Tie Wires: 9 gauge aluminum
- F. Bottom Tension Wire Hog Rings: 9 gauge steel

#### 2.04 GATE FEATURES

- A. Opening Width: 16-feet minimum
- B. Type: Double gate with center drop rod
- C. Center Stop: Mushroom-Type, Self-Cleaning
- D. Hinges: Box-Type (Bulldog)
- E. Locking Forks: Double-forked bar

#### 2.05 HARDWARE

- A. Hot-dipped galvanized steel bolts, washers and nuts.

### **PART 3 - EXECUTION**

#### 3.01 PREPARATION

- A. Make notes, take measurements, and document the original position and condition of the fence before removal.
- B. Disassemble the fence without damaging the components.
- C. Salvage and store components for future use.
- D. Replace any damaged components at no additional cost to the Owner.

#### 3.02 ERECTION AND INSTALLATION

- A. Install salvaged components back to their original position, or as follows:
- B. Line Posts:
  - 1. Install 10-feet on center.
  - 2. Anchor in 10-inch diameter by 36-inch deep concrete.

3. Set bottom of post at 36-inches below grade.
- C. Terminal (Corner) and Gate Posts:
1. Install to 3 -feet below grade.
  2. Anchor in 12-inch diameter by 36-inch deep concrete.
  3. Install bracing between corner / end posts and the first ensuing line post.
  4. Install a diagonal 3/8-inch truss rod between corner / end posts and the first ensuing line post.
- D. Gates:
1. Install a horizontal rail for gates over 6-feet tall.
  2. Utilize tension bands and rods for connecting the fence fabric to the frame.
- E. Fence Fabric Installation:
1. Tie Wire Connections:
    - a. Line Posts: 12" on center
    - b. Top Rail: 12" on center
  2. Hog Ring Connections: Connect bottom tension wire to fence 12" on center.
  3. Connect to fabric to terminal and gate posts by using tension (stretcher) bars connected to the post every 14-inches using bands and hardware.
- F. Tension Wire: Stretch tension wire from terminal post to terminal post (or gate post) and attach directly to post.
- G. Grade areas under the proposed fence to ensure no gaps under fence.
- H. Grade swing range of gates to ensure smooth gate opening.

**END OF SECTION**

**SECTION 32 90 20  
SEED, FERTILIZE, AND MULCH**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes seeding, fertilizing, and mulching areas disturbed by construction activities.
- B. Use only hydro-seeding application.

1.02 RELATED WORK

- A. Section 31 22 10 – Site Grading
- B. Section 31 25 00 – Erosion and Sediment Control

1.03 REFERENCES

- A. Idaho Department of Environmental Quality’s Catalog of Stormwater Best Management Practices.

1.04 SUBMITTALS

- A. Seed Mixture and Application Rate Data
- B. Fertilizer and Application Rate
- C. Mulching Material and Application Rate
- D. Hydro-seeding Equipment

**PART 2 - PRODUCTS**

2.01 SEED MIXTURE

A. Mixture	% by Wt	Min % Pure Seed	Min Germination
1. Red Fescue	40%	39.2%	90%
2. Perennial Rye Grass	40%	39.2%	90%
3. Colonial Bent Grass	10%	9.8%	85%
4. White Clover, pre-inoculated	10%	9.8%	90%
5. Weeds		0.5%	

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6. Inert/Other 1.5%

2.02 FERTILIZER

- A. Top soil shall be tested for nutrient content prior to fertilizer formulation. Soil sample results, fertilizer formulation, and application rate to be approved by Owner representative before use.
- B. Sufficient quantities of fertilizer shall be applied to supply the following amounts of nutrients, unless otherwise determined by soil testing.

Nutrient (unless otherwise approved)	# per acre
1. Total Nitrogen as N	135
2. Available Phosphoric Acid as P <sub>2</sub> O <sub>5</sub>	60
3. Soluble Potash as K <sub>2</sub> O	60

2.03 MULCH

- A. Wood cellulose mulch applied at 2500 pounds per acre.
- B. Tackifier shall be mixed and applied in accordance with the manufacturer's recommendations.

**PART 3 - EXECUTION**

3.01 TOPSOIL

- A. Where indicated in the plans, place imported topsoil over area to be seeded. Soil shall be placed so as to avoid over-compaction by wheeled equipment and vehicles.

3.02 FERTILIZER

- A. Work soil to be seeded until soil is reasonably even and loose.
- B. Fertilize the area at the approved application rate.

3.03 SEED

- A. Seed recommended rate (unless otherwise approved).
  - 1. 200 pounds per acre.

3.04 MULCH

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- A. Apply mulch on seeded area loose enough to allow some sunlight to penetrate and air to circulate but thick enough to shade the ground, conserve soil moisture, and prevent/reduce erosion.
- B. Do not perform mulching activities during periods of excessively high winds, which would preclude the proper placing of the mulch.

### 3.05 HYDROSEEDING

- A. Apply seed, fertilizer, and mulch on disturbed areas as soon as construction is complete.
- B. Apply using equipment suited for hydro-seed application.

**END OF SECTION**

**SECTION 33 01 31  
TEMPORARY SEWER BYPASS**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This section includes requirements for implementing a temporary pumping system for the purpose of diverting existing sewage flow around work area for the duration of the project.

**1.02 RELATED WORK**

- A. Section 31 23 13 – Excavation, Trenching and Backfill for Pipelines
- B. Section 33 05 61 – Sanitary Sewer Manholes

**1.03 QUALITY ASSURANCE**

- A. Follow national standards and requirements as specified herein.
- B. Perform leakage and pressure tests on discharge piping using clean water, before operation. Notify Engineer 24 hours prior to testing.
- C. Maintain and inspect temporary pumping system every four hours. Responsible operator shall be on site when pumps are operating.
- D. Keep and maintain spare parts for pumps and piping on site, as required.
- E. Maintain adequate hoisting equipment and accessories on site for each pump.

**1.04 SUBMITTALS**

- A. Submit following Section 01 33 00.
  - 1. Detailed plan and description of proposed pumping system. Indicate number, size, material, location and method of installation of suction and discharge piping, size of pipeline or conveyance system to be bypassed, staging area for pumps, site access point, and expected flow.
    - a. Size and location of manhole or access points for suction and discharge hose or piping.
    - b. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill, if buried.
    - c. Temporary pipe supports and anchoring required.

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- d. Thrust and restraint block sizes and locations.
  - e. Sewer plugging method and type of plugs.
  - f. Bypass pump sizes, capacity, number of each size to be on site and power requirements.
  - g. Backup pump, power and piping equipment.
  - h. Calculations of static lift, friction losses, and flow velocity. Pump curves showing pump operating range.
  - i. Design plans and computation for access to bypass pumping locations indicated on drawings.
  - j. Calculations for selection of bypass pumping pipe size.
  - k. Method of noise control for each pump and/or generator.
  - l. Method of protecting discharge manholes or structures from erosion and damage.
  - m. Schedule for installation and maintenance of bypass pumping lines.
  - n. Procedures to monitor upstream mains for backup impacts.
  - o. Procedures for setup and breakdown of pumping operations.
  - p. Emergency plan detailing procedures to be followed in event of pump failures, sewer overflows, service backups, and sewage spillage.
    - 1) Maintain copy of emergency plan on site for duration of project.
- B. Certify bypass system will meet requirements of codes, and regulatory agencies having jurisdiction.

### 1.05 DELIVERY AND STORAGE

- A. Transport, deliver, handle, and store pipe, fittings, pumps, ancillary equipment and materials to prevent damage and following manufacturer's recommendations.
- B. Inspect all material and equipment for proper operation before initiating work.
- C. Material found to be defective or damaged due to manufacturer or shipment:
  - 1. When Engineer deems repairable: Repair as recommended by manufacturer.
  - 2. When Engineer deems not repairable: Replace as directed by

Engineer before initiating work.

3. Repair or replacement of defective or damaged material and equipment will be at no cost to Owner.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. Discharge and Suction Pipes: Approved by Engineer.
  1. Discharge piping: Determined according to flow calculations and system operating calculations.
  2. Suction piping: Determined according to pump size, flow calculations, and manhole depth following manufacturer's specifications and recommendations.
- B. Polyethylene Plastic Pipe:
  1. High density solid wall and following ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-DR) based on Outside Diameter, ASTM D1248 and ASTM D3550
  2. Homogenous throughout, free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.
- C. High-Density Polyethylene (HDPE).
  1. Homogenous throughout, free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.
  2. Defective areas of pipe: Cut out and joint fused as stated herein.
  3. Assembled and joined at site using couplings, flanges or butt-fusion method to provide leak proof joint. Follow manufacturer's instructions and ASTM D 2657.
  4. Threaded or solvent joints and connections are not permitted.
  5. Fusing: By personnel certified as fusion technicians by manufacturer of HDPE pipe and/or fusing equipment.
  6. Butt-fused joint: True alignment and uniform roll-back beads resulting from use of proper temperature and pressure.
  7. Allow adequate cooling time before removal of pressure.
  8. Watertight and have tensile strength equal to that of pipe.
  9. Acceptance by Engineer before insertion.

10. Use in streams, storm water culverts and environmentally sensitive areas.

D. Flexible Hoses and Associated Couplings and Connectors.

1. Abrasion resistant.
2. Suitable for intended service.
3. Rated for external and internal loads anticipated, including test pressure.
4. External loading design: Incorporate anticipated traffic loadings, including traffic impact loading.
5. When subject to traffic loading, compose system, such as traffic ramps or covers.
  - a. Install system and maintain H-20 loading requirements while in use or as directed by the Engineer.

E. Valves and Fittings: Determined according to flow calculations, pump sizes previously determined, and system operating pressures.

F. Plugs: Selected and installed according to size of line to be plugged, pipe and manhole configurations, and based on specific site.

1. Additional plugs: Available in the event a plug fails. Plugs will be inspected before use for defects which may lead to failure.

G. Aluminum "irrigation type" piping or glued PVC piping will not be permitted.

H. When approved by Engineer, discharge hose will be allowed in short sections.

## 2.02 EQUIPMENT

A. Fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in priming system.

B. Electric, gasoline, or diesel powered.

C. Constructed to allow dry running for long periods of time to accommodate cyclical nature of effluent flows.

D. Provide.

1. Necessary stop/start controls for each pump.
2. One standby pump of each size maintained on site.

## 2.03 DESIGN REQUIREMENTS

A. Bypass pumping systems:

1. Adequate capacity to pump variable flows:
  - Peak flows of 560 GPM
  - Average flows of 60 GPM.
2. Operate 24 hours per day.
- B. Provide pipeline plugs and pumps of adequate size to handle peak flow, and temporary discharge piping to ensure total flow of main can be safely diverted around work area.
- C. Temporary intake structures shall be installed as needed to provide a connection point for the suction pipe. If existing manholes or other structures are found to be suitable as intake structures, their use is subject to approval by the Engineer.

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Determining location of bypass pipelines.
  1. Minimize disturbance to existing utilities.
  2. Field locate existing utilities in proposed bypass area.
  3. Obtain approvals for placement within public or private property.
  4. Obtain Engineer's approval of location.
  5. Costs associated with relocation of utilities and obtaining approvals is at no cost to the Owner.

#### **3.02 UTILITY CONFLICTS**

- A. Provisions and requirements must be reviewed by Engineer before starting construction.
- B. Remove manhole sections or make connections to existing sewer and construct temporary bypass pumping structures at access location indicated on Drawings and as required to provide adequate suction conduit.
- C. Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance of work, remove in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
- D. When working inside manhole or force main, exercise caution. Follow OSHA, Local, State and Federal requirements. Take required measures to protect workforce against sewer gases and/or combustible or

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oxygen-deficient atmosphere.

- E. Installation of Bypass Pipelines:
  - 1. Pipeline may be placed along shoulder of roads.
  - 2. Do not place in streets or sidewalks.
  - 3. When bypass pipeline crosses local streets and private driveways, place in roadway ramps.
  - 4. When roadway ramps cannot be used, place bypass in trenches and cover with temporary pavement as approved by Engineer.
- F. During bypass pumping operation, protect sewer lines from damage inflicted by equipment.
- G. Upon completion of bypass pumping operations, and after the receipt of written permission from Engineer, remove piping, restore property to pre-construction condition and restore pavement.

**END OF SECTION**

**SECTION 33 05 61  
SANITARY SEWER MANHOLES**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Work covered by this section includes standard, shallow, and deep concrete manholes, drop manholes, manhole modification, adjustment rings, frames and covers for community wastewater collection systems.

1.2 RELATED WORK

- A. Section 31 24 10 – Embankment and Engineered Fill
- B. Section 31 23 10 – Excavation, Trenching and Backfill
- C. Section 31 31 13 – Sanitary Sewer
- D. Section 03 30 00 – Concrete

1.3 REFERENCES

- A. ASTM A48 – Standard Specification for Gray Iron Castings
- B. ASTM C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- C. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections
- D. ASTM C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
- E. ASTM C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
- F. ASTM C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test

1.4 SUBMITTALS

- A. Manhole frame and cover
- B. Manhole steps
- C. Precast manhole sections
- D. Precast manhole base sections
- E. Joint sealing material

- F. Mastic Wrap
- G. Pipe to manhole connections

1.5 DEFINITIONS

- A. Shallow Manhole: Manholes with a depth from rim to outlet pipe invert equal to 7-feet or less, and with a flat top.
- B. Standard Manhole: Manholes with a depth from rim to outlet pipe invert greater than 7-feet but not more than 8 -feet, and with a conical top section.

**PART 2 - PRODUCTS**

2.1 MANHOLES

- A. Design and fabricate reinforced concrete manholes to conform to ASTM C478.
- B. Concrete compressive strength will meet or exceed 4000 pounds per square inch at 28 days.
- C. Base Section:
  - 1. 8-Inch thick precast concrete bottom section with monolithic barrel section and precast channels for standard manholes.
  - 2. Bases poured onsite with channels are acceptable with written approval by the Owner and shall conform to Section 03 30 00
  - 3. Channel (or invert) shape:
    - a. Smooth.
    - b. Semicircular.
    - c. Same diameter as adjoining sewer pipe.
    - d. Ogee shaped, so there is no free drop.
    - e. Make transitions in size and grade of channels gradually and evenly.
  - 4. Drop:
    - a. Minimum: 0.10 feet through manholes measured from any invert in to the invert out.
    - b. Maximum: 2 feet through manholes measured from any invert in to the invert out.
- D. Barrel Sections:
  - 1. 48-Inch inside diameter with 5-inch thick concrete walls, unless otherwise specified.
- E. Cone Sections:
  - 1. Eccentric cone sections with 5-inch thick concrete walls, unless otherwise specified.
- F. Shallow Manhole Top Slab Sections:

1. Provide manhole opening eccentrically located to allow positioning over the outlet.

G. Manhole Floor

1. Slope manhole floor from manhole wall to the channel.
2. Smooth finish,
3. Minimum drop of 1-inch; Maximum drop of 2-inches.

H. Manhole Steps:

1. Conform to ASTM A48.
2. Cast and anchor steps in concrete sections, aligned to form a continuous ladder.
3. Install steps so they are horizontal, protruding 5-inches, minimum.
4. Material: minimum 1/2-inch grade 60 steel steps encased in neoprene or polypropylene.
5. Width: 12-inches, minimum.
6. Space rungs 12-inches apart.
7. Maximum spacing from the top of the cone to the first rung shall be 6-inches.
8. Center steps over the manhole outlet.

I. Manhole Adjustment Rings:

1. Concrete rings.
2. HDPE rings

J. Sewer Pipe Connection:

1. Connect pipe to manhole using a watertight pipe to structure gasket precast into the manhole wall conforming to ASTM C923.
2. PSX Positive Seal Gasket System or approved equal.

K. Joints:

1. O-ring or flexible gasket conforming to ASTM C443.
2. Use plastic cement putty meeting Federal Specification SS-C-153 or a non-shrink hydraulic cement mortar on all interior and exterior joints.
3. Mastic wrap for exterior joints, 8-inch minimum width.
4. Exterior joint collars.
  - a. Multi-layer wrap with steel straps.
  - b. Minimum 8-inch width.
  - c. Equal to Cretex Wrap External Manhole Joint Sealer.

## 2.2 FRAMES AND COVERS

A. Fabricate from cast iron.

1. Clean and smooth.
2. Free from distortion, shrinkage or other defects.
3. Conform to detail drawings.

B. Combined Weight: 325 pounds, minimum conforming to ASTM A 48.

C. Frame:

1. Designed for use with covers without open pickholes.
2. Machined, horizontal bearing surfaces.

D. Cover:

1. Machined horizontal bearing surfaces.
2. Neoprene ring gasket.
3. Solid cover with concealed pickhole.
4. No vented lids.
5. Cast with lettering "SEWER".

E. Equal to East Jordan 1045 or Neenah R-1760-A.

F. Hydrophilic Butyl Rubber Water Stop

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

A. Construct manholes at the locations and elevations shown on the plans.

B. Refer to Section 31 23 10 for excavation and backfill requirements.

C. Install manholes so that the walls are vertically plumb.

D. Bed precast manhole bases in a minimum of 6 inches of compacted clean sand or crushed rock.

E. Construction of Invert:

1. PVC Pipe Invert Channel:
  - a. Install a full length of pipe through the manhole.
  - b. Form a concrete bench up to the spring-line of the pipe.
  - c. Slope the concrete bench toward the channel at a 1-inch per foot, minimum.
  - d. Cut the top hemisphere of the pipe off for the entire length of the pipe through the manhole.
2. Formed Concrete Channel:
  - a. Ensure that the channel is smooth and free of rough patches.
  - b. Changes in Pipe Size or Grade: Make changes in size and grade of channels gradually and evenly.
  - c. Changes in Direction: Smooth curve of as large a radius as the size of the manhole will permit with the intersection of the lines occurring at the center of the manhole.
  - d. Benches: Construct the manhole floor, outside of the channel, smooth and slope toward the channel not less than 1-inch per foot but not more than 2-inches per foot.

F. Connection of Sewer Main Pipe:

1. Install sanitary sewer main in accordance with pipe to manhole gasket manufacturer's recommendations.
2. Outside Drop Construction:
  - a. Install an outside manhole drop where the invert of the inlet pipe is more than 24-inches higher than the invert of the outlet pipe.
  - b. Use the same material as was used for the sewer main pipe to construct the drop.
  - c. Construct according to the detail drawings.

G. Top Slab Section Installation:

1. Install with the opening over the outlet of the manhole.
2. Use on shallow manholes only.

H. Conical Section Installation:

1. Install with the opening over the outlet of the manhole.
2. Install 4-feet of manhole section with cylindrical configuration before installing a conical section.
3. Use on standard manholes.

I. Joint Sealants:

1. Install flexible joint gaskets around entire circumference of each manhole joint.
2. Seal interior and exterior joints with non-shrink hydraulic cement mortar or plastic cement putty.
3. Ensure that a watertight seal is provided at all joints.
4. Install mastic wrap on all exterior joints per manufacturers written recommendations.

J. High Groundwater

1. Install exterior joint collars in areas where high groundwater is encountered.
2. Install in accordance with manufacturers recommendations.
3. Where unexpected groundwater is encountered payment will be made at the negotiated cost per joint sealed.

K. Adjustment Rings:

1. Group adjustment rings in place when the manhole is constructed.
2. Install at least one adjustment ring, and no more than 12-inches of adjustment rings.
3. Grout/seal manhole rings inside and outside at the time when the manhole is constructed.

L. Frame and Cover:

1. Set manhole frames and covers to the elevation indicated on the plans.

2. If a road finish grade exists, set manhole frames and covers to the finish grade of the road.
3. Seal frame with hydrophilic butyl rubber water.

M. Refer to Section 31 22 10 for finish grading requirements.

3.2 PRESSURE AND LEAKAGE TESTING

- A. Test all manholes using a low pressure vacuum or hydrostatic exfiltration/infiltration test.
- B. Provide all testing equipment and water and perform tests in the presence of an approved project representative.
- C. Manholes will not be accepted prior to passing an approved leakage test.
- D. Preparation:
  1. Plug all lift holes.
  2. Temporarily plug all pipes entering the manholes.
  3. Secure all plugs to prevent them from being drawn into or blown out of the manhole.
- E. Vacuum Testing Procedure: Test according to ASTM C1244.
  1. Place test head at the top of the manhole in accordance with manufacturer’s recommendations.
  2. Pressurize manhole to 4.9 psi (10 inches of mercury).
  3. Determine elapsed time for the pressure to drop 0.5 psi (1 inch of mercury) from the test pressure and use the following table to determine acceptability.

Minimum Test Times for Various Manhole Diameters (ASTM C1244)

Depth (ft)	Diameter, in								
	30	33	36	42	<b>48</b>	54	60	66	72
8	11	12	14	17	<b>20</b>	23	26	29	33
10	14	15	18	21	<b>25</b>	29	33	36	41
12	17	18	21	25	<b>30</b>	35	39	43	49
14	20	21	25	30	<b>35</b>	41	46	51	57
16	22	24	29	34	<b>40</b>	46	52	58	67
18	25	27	32	38	<b>45</b>	52	59	65	73
20	28	30	35	42	<b>50</b>	53	65	72	81
22	31	33	39	46	<b>55</b>	64	72	79	89
24	33	36	42	51	<b>59</b>	64	78	87	97
26	36	39	46	55	<b>64</b>	75	85	94	105
28	39	42	49	59	<b>69</b>	81	91	101	113
30	42	45	53	63	<b>74</b>	87	98	108	121

4. The time interval recorded in the field must be greater than the time listed for the depth and manhole diameter being tested and for the pressure drop recorded.
5. If the pressure drop time is less than that in the table for the diameter of manhole being tested, the test shall be considered failed.

- a. Repair manhole and retest until the test passes.

F. Hydrostatic Infiltration/Exfiltration

1. Visible manhole leakage will not be allowed
2. Hydro static head must exceed maximum estimated groundwater level by at least 12-inches.
3. Fill manholes to within 6-inches of cover frame.
4. Manholes may be filled 24 hours in advance of testing to allow for absorption.
5. Allowable leakage for a 4 foot diameter concrete manhole not to exceed 0.2gallons per foot of depth per hour.
6. Perform test for minimum of 2 hours.
7. Owner has the authority to extend test in 2 hour increments up to 6 hours.

- G. Repair all leakage or seepage that appears during the warranty period.

3.3 MANHOLE MODIFICATION

- A. Remove piping as indicated in the contract drawings. Sawcut pipes as indicated with a clean, square cut perpendicular to the pipe barrel.
- B. Core drill the manhole at the indicated invert elevation. The hole shall be oversized to provide annular space to seal the new pipe.
- C. The new pipe penetration shall be sealed with non-shrink grout.
- D. The old hole shall be patched and filled with non-shrink grout.
- E. Any damage to the existing manhole or piping shall be repaired at no cost to the owner.

**END OF SECTION**

**SECTION 33 05 63  
FLOW CONTROL VAULT**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Work covered by this section includes furnishing and installing a precast concrete flow control vault including internal equipment, and external valves and piping.

1.2 RELATED WORK

- A. Section 31 24 10 – Embankment and Engineered Fill
- B. Section 31 23 10 – Excavation, Trenching and Backfill
- C. Section 31 31 13 – Sanitary Sewer
- D. Section 03 30 00 – Concrete

1.3 REFERENCES

- A. ASTM A48 – Standard Specification for Gray Iron Castings
- B. ASTM C858 – Standard Specification for Underground Precast Concrete Utility Structures
- C. ASTM C857 – Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
- D. ASTM C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

1.4 SUBMITTALS

- A. Manufacturer's cut sheet data on precast items.
- B. Shop drawings with dimensions of vault, location of openings, reinforcing steel, and thickness of walls, floor, and top slab.
- C. Shop drawings with dimensions of box weir, location of openings, thickness and material of sides, bottom, pipe outlet, feet, and mounting bars.
- D. Manufacturer's catalog data, descriptive literature, and installation instructions for the Discharge Flow Regulator.
- E. Manufacturer's catalog data, descriptive literature, and installation instructions for the waterproofing coating.
- F. Manufacturer's catalog data, descriptive literature, and installation instructions for the joint sealing material.

1.5 DEFINITIONS

- A. Flow Control Vault: A precast concrete underground utility vault, with nominal dimensions and appurtenances as shown on the contract drawings.
- B. Discharge Flow Regulator: A mechanically operated device that restricts flows discharging from the Flow Control Vault to a preset maximum flow rate that remains constant regardless of headwater level.
- C. Overflow Box Weir: A stainless steel box with an open top, and pipe outlet, with nominal dimensions and appurtenances as shown on the contract drawings, and the top set at the designated elevation to serve as a sharp-crested weir.

**PART 2 - PRODUCTS**

2.1 VAULT

- A. A. Precast concrete vaults shall comply with ASTM C 858.
- B. Concrete compressive strength will meet or exceed 4000 pounds per square inch at 28 days.
- C. Design live and dead loads shall be in accordance with ASTM C 857.
- D. Precast vault construction shall be in the form of monolithic walls or horizontal wall sections; do not use panel walls.
- E. Minimum wall thickness shall be 6 inches. Design knockout wall panels to accommodate earth loading pressures.
- F. Design and construct vaults to be watertight when subjected to groundwater over the entire height of the vault.:
- G. Provide openings in precast vaults for piping and access. Provide cast in place inserts in the roof slab and end walls at the locations as shown on the Drawings. No field coring of openings is allowed:
- H. Channel Floor
  - 1. Slope vault floor from wall to the channel.
  - 2. Smooth finish,
  - 3. Minimum drop of 1-inch; Maximum drop of 2-inches.
- I. Vault Steps:
  - 1. Conform to ASTM A48.
  - 2. Cast and anchor steps in concrete sections, aligned to form a continuous ladder.
  - 3. Install steps so they are horizontal, protruding 5-inches, minimum.
  - 4. Material: minimum 1/2-inch grade 60 steel steps encased in neoprene or polypropylene.
  - 5. Width: 12-inches, minimum.
  - 6. Space rungs 12-inches apart.

7. Maximum spacing from the top of the cone to the first rung shall be 6-inches.
8. Center steps under the vault access hatch.

J. Sewer Pipe Connection:

1. Connect pipe to vault using a watertight pipe to structure gasket precast into the manhole wall conforming to ASTM C923.

K. Joints:

1. Fill joints between precast sections with a double layer of plastic sealing compound and make watertight. Plastic sealing compound shall comply with Federal Specification SS-S- 00210. Fill with mortar all recesses, lifting inserts, or other cavities not filled with plastic sealing compound. Mortar shall comply with ASTM C 387, Type S.

L. Waterproofing:

1. Interior surface of the vault shall be coated with a coal tar epoxy to form a dry film thickness of 16 to 20 mils. Epoxy shall be applied to a clean and dry concrete surface in accordance with the manufacturer's recommendations.

## 2.2 VAULT HATCH

A. Double leaf access door.

1. H20 Load Rating.
2. Extruded aluminum frame.
3. ¼ Inch aluminum diamond plate door panels.
4. Auto-lock T-316 Stainless Steel (SS) hold open arm.
5. T-316 SS Hinges and hardware.
6. T 316 SS Slam lock with removable key
7. Recessed lifting Handle.

## 2.3 DISCHARGE FLOW REGULATOR

A. Hydro-mechanical operation to regulate discharge flow to a fixed maximum value

1. Stainless Steel 316 construction
2. Accuracy +/- 5%
3. Automatic self-flushing to prevent clogging.
4. Field adjustable discharge rate.
5. Discharge rate is constant with headwater levels up to 10 feet.

B. Tru-Flo Type 1 compact regulator by Grande Water Management Systems, or pre-approved equal.

## 2.4 OVERFLOW BOX WEIR

A. Fabricated stainless steel box to serve as a broad-crested weir for overflow.

1. Submit shop drawings for approval prior to fabrication.
2. Stainless Steel 316 construction.

3. Outlet pipe with 10-inch ANSI B16.5 Class 150 Flange.
4. Welding completed in accordance with American Welding Society standards
5. Box construction shall be square and true. Top edge shall form a consistent weir crest on all sides.
6. Box shall be mounted to vault wall and floor with concrete wedge anchors.

### **PART 3 - EXECUTION**

#### **3.1 VAULT INSTALLATION**

##### **A. Excavating And Backfilling For Vaults**

1. Perform earthwork as specified in Structural Excavation. Provide 6-inch minimum thickness 3/4-inch crushed aggregate over the full width of the vault base and extend 12 inches beyond the edges of the vault. After repairing the waterproofing, backfill and compact around the vault with structural backfill material. Excavated material may be used for structural backfill provided it conforms to the Specifications for structural backfill material.

##### **B. Installing Vaults And Risers**

1. Set each precast concrete vault section or riser plumb on a double layer bed of sealant at least 1/2-inch thick to make a watertight joint with the preceding unit. Point the inside joint and wipe off the excess sealant.

##### **C. Waterproofing**

1. Waterproofing shall be applied to all interior surfaces of vaults and risers. Apply according to the manufacturer's recommendation to provide a dry film thickness of 16 to 20 mils. Any area of the coating that is damaged during construction shall be recoated.

#### **3.2 DISCHARGE FLOW REGULATOR INSTALLATION**

- A. Flow regulator shall be installed in accordance with the manufacturer's recommendations.
- B. Following installation, flow regulator shall be tested to demonstrate proper operation. Provide all testing equipment and water and perform tests in the presence of an approved project representative.

**END OF SECTION**

**SECTION 33 31 13  
SANITARY SEWER**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes the construction of sanitary sewer mains, sewer main cleanouts, fittings, sewer line testing, and connection to existing sewage collection systems.

1.02 RELATED WORK

- A. Section 31 23 13 – Excavation, Trenching and Backfill for Pipelines
- B. Section 33 05 61 – Sanitary Sewer Manholes

1.03 REFERENCES

- A. ANSI/AWWA C110 / A21.10 – Ductile-Iron and Gray-Iron Fittings, 3 Inch Through 48 Inch, for Water and Other Liquids
- B. ANSI / AWWA C111 / A21.11 – Rubber Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings
- C. ANSI / AWWA C151 / A21.51 – Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids
- D. ANSI/AWWA C 900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In., For Water Transmission and Distribution.
- E. ASTM D 1248 – Polyethylene Plastics Molding and Extrusion Materials
- F. ASTM D 2122 – Determining Dimensions of Thermoplastic Pipe and Fittings
- G. ASTM D 3034 – Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
- H. ASTM D 3212 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- I. ASTM F 477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe

- J. ASTM F 1417 – Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

#### 1.04 SUBMITTALS

- A. Sewer Main Pipe
- B. Sewer Main Fittings
- C. Valves and Appurtenances

#### 1.05 ACCEPTANCE

- A. The Work will not be accepted until satisfactory pipe backfilling, testing, and clean up is complete.
- B. If the Work does not meet the specified requirements of this section and related sections, remove, replace, and retest at no additional cost.

### **PART 2 - PRODUCTS**

#### 2.01 SEWER PIPE MATERIALS

- A. Polyvinyl Chloride (PVC) Sewer Pipe, D 3034
  - 1. Conform to ASTM D 3034.
  - 2. Pipe Class: SDR-35
  - 3. Bell ended joints conforming to ASTM D 3212
  - 4. Elastomeric gaskets conforming to ASTM F 477
  - 5. Standard lengths of Sewer Pipe shall be at least 20 feet
  - 6. Each length of pipe shall be clearly marked with the following:
    - a. Manufacturer
    - b. Nominal Pipe Size
    - c. The PVC Cell Classification
    - d. Type PSM PVC Sewer Pipe
    - e. ASTM Designation
    - f. Pipe Class
- B. Polyvinyl Chloride (PVC) Sewer Pipe, C 900
  - 1. Conform to AWWA C 900
  - 2. Pipe Class: DR-18

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3. Elastomeric gaskets conforming to ASTM F 477
4. Standard lengths of Sewer Pipe shall be at least 20 feet
5. Each length of pipe shall be clearly marked with the following:
  - a. Manufacturer
  - b. Nominal Pipe Size
  - c. The PVC Cell Classification
  - d. Type PSM PVC Sewer Pipe
  - g. AWWA Designation
  - h. Pipe Class

C. Polyethylene Pipe and Fittings

1. Conform to AWWA C 906
2. Designation: PE 3406, DR 11
3. Outside Diameter Base: IPS
4. Fittings: PE 3406, thermal butt-fusion welded per ASTM D 3261

D. Ductile Iron Sewer Pipe

1. Conform to AWWA C151.
2. Pipe Thickness Class: 50, or 53
3. Exterior Coating: asphaltic coating, 1 mil thick, minimum
4. Rubber gasket, push on joints conforming to AWWA C111
5. Interior Lining: 40 mils Protecto 401 ceramic epoxy, or approved substitution.
6. Each length of pipe shall be clearly marked with the following:
  - a. Manufacturer
  - b. Nominal Pipe Size
  - c. ASTM Designation
  - d. Pipe Class

E. Ductile Iron Fittings

1. Ductile Iron Compact Fittings 4 Inch: ANSI/AWWA C 153
2. Pressure Class 350 psi
3. External Coating: Asphaltic coating, 1 mil thick minimum.
4. Internal Coating: 40 mils Protecto 401 ceramic epoxy, or approved substitution.

F. Perforated PVC Drain Pipe

1. Conform to ASTM D 3034.
2. Pipe Class: SDR-35
3. Bell ended joints conforming to ASTM D 3212
4. Elastomeric gaskets conforming to ASTM F 477
5. Perforations: Two rows of ½-inch diameter holes, spaced at 5 inches (+/- ¼-inch) along the length of the pipe. The two rows of holes shall be offset +/- 120 degrees on the circumference of the pipe. Pipe shall be installed with the holes facing down, and centered over the invert of the pipe.

2.02 SEWER APPURTENANCES

A. Manholes: Refer to Section 33 05 61.

B. Sewer Main Cleanouts

1. Riser Pipe:
  - a. Conform to ASTM D 3034.
  - b. Pipe Class: SDR-35
  - c. Elastomeric gasket joints conforming to ASTM D 3212
  - d. 6-Inch diameter unless otherwise specified.
2. Concrete Collar: Cast-In-Place - Refer to Section 03 30 00 for concrete requirements.
3. Frame and Cover:
  - a. Heavy duty slab type
  - b. Machined bearing surfaces
  - c. Neoprene gasket seal
  - d. Lockable with stainless steel cap screws
  - e. Neenah R-6461-CH or approved equal.

C. Sanitary Wyes and Tees

1. Tees and wyes shall be the same material as the pipe being connected, unless otherwise indicated.

D. Gate Valves

1. Resilient Seated Gate Valve

2. Conform to AWWA C509.
3. Body: Cast iron, flanged or mechanical joint; non-rising stem
4. Interior and Exterior Coating: Epoxy conforming to AWWA C550
5. Operator: 2-inch square nut, opening counterclockwise.
6. Valve/Curb Box: Cast iron, adjustable, 5-1/4 inch min. inside diameter with lid.
7. Operator Extension: Square valve extension stem
  - a. Use on valves where the operator is more than 36 inches below grade.
  - b. Extended operating nut shall be within 12 inches of finished grade.
  - c. Extension shall be: Trumbull 1-1/4" square extension stem with valve position indicator, or equivalent.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that dimensions and elevations are as indicated on the Drawings.
- B. Verify that all products are in new condition.
- C. Inspect pipe and fittings for defects.
- D. Remove materials from the site that are defective, damaged, used, unsound, or that otherwise do not meet the specifications.

#### **3.02 UTILITY CONFLICTS**

- A. Refer to Section 31 23 10.

#### **3.03 SEWER MAIN INSTALLATION**

- A. Staking: Completed in accordance with Section 01 72 00.
- B. Pipe Installation:
  1. Adhere to the excavation, trenching and backfill requirements of Section 31 23 10.
  2. Install pipe and fittings in accordance with these specifications and the manufacturer's recommendations.

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3. Lay pipe of the size, and to the line and grade indicated on the drawings.
  4. Install pipe beginning at the lowest elevation and proceeding to the highest elevation.
  5. Point the spigot end in the direction of flow.
  6. Protect pipe interior from soil, trench water and foreign objects.
  7. Temporarily plug the exposed end of pipes whenever the trench is left unattended or when trench conditions necessitate.
- C. Connection to Existing Manholes: Make connection as directed by the Project Engineer with the manhole floor reshaped to provide a channel in conformance with Section 33 05 61 – Sanitary Sewer Manholes.

### 3.04 SEWER MAIN CLEANOUTS

- A. Furnish and install at the locations indicated on the Drawings.
- B. Construct as shown on the standard detail drawing.

### 3.05 SEWER MAIN TESTING

- A. General:
  1. Test the mains after the trenches are backfilled and final grading is finished.
  2. Furnish all materials, labor and equipment to perform the required tests.
  3. Perform all tests in the presence of the Project Engineer or his/her representative.
  4. Repair all sections of sewer not passing the tests, in accordance with Project Engineer approved methods, at no cost to the Project.
  5. Retest sewer until tests pass the requirements, at no cost to the Project.
- B. Alignment
  1. Alignment will be checked by the Project Engineer and at the discretion of the Project Engineer.

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2. Lamping shall be performed after the sewer line has been completely backfilled.
3. Sewer main out of alignment with respect to line or grade, by more than 0.10 feet, shall be reinstalled at the contractor's expense.

C. Deflection Test

1. Perform the deflection or "go-no-go" test on all sewer main.
2. Testing Device:
  - a. Use a mandrel, or some other Project Engineer approved rigid, cylindrical object of proper dimensions.
  - b. Mandrel Dimensions for SDR 35 Pipe:

Nominal Pipe Size	Mandrel O.D. (inches)
6	5.31
8	7.09
10	8.84
12	10.51
15	12.86

D. Infiltration Test

1. Infiltration tests shall be made in a manner approved by and in the presence of the Project Engineer.
2. Measure infiltration in all lines.
3. Maximum allowable infiltration is 200 gallons per day per inch diameter per mile of sewer line under external pressure.
4. All gravity sewers and appurtenances shall be free of visible leakage and all such leaks shall be corrected.
5. Infiltration of groundwater in an amount greater than specified, following a successful air test shall be considered as evidence that the air test was in error or that subsequent failure of the pipelines has occurred.

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6. Failures, which occur within the warranty period, shall be corrected at no additional expense to the project.

E. Air Test

1. All gravity sewers and appurtenances shall successfully pass a low-pressure air test prior to acceptance.
2. Preparation: Clean all sewer pipe before the test.
3. Testing Equipment:
  - a. Plugs: mechanical or pneumatic type. One shall have an inlet tap for adding air to the sewer line.
  - b. Air Compressor
  - c. Main Shutoff Valve
  - d. Pressure Relief Valve: 9 psig relief
  - e. Input Pressure Gauge
  - f. Continuous Monitoring Pressure Gauge: Minimum divisions of 0.10 psi with an accuracy of +/- 0.04 psi.
4. Testing Procedure: Test according to the Time-Pressure Drop Method outlined in ASTM F 1417.
  - a. Plug all pipe outlets with test plugs capable of holding under the test pressures.
  - b. Install plugs and brace as necessary to ensure that the plugs will not blow out when the main is under pressure.
  - c. Inspect sewer main pipe integrity in the area that will not be tested due to the plug, and report any possible defects to the Project Engineer.
  - d. Pressurize Pipe:
    - (1) Introduce air slowly until air pressure reaches 4.0 psig greater than any backpressure resulting from groundwater over the pipe, where the pressure equals:  
$$4.0 \text{ psi} + (0.43 \text{ psi} \times \text{Depth of Groundwater over Pipe Invert in Feet})$$
    - (2) Never exceed a pressure of 9.0 psig.
  - e. Do not enter manhole once pipe is pressurized.

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- f. Maintain pressure for at least two (2) minutes.
- g. Disconnect air supply after the initial two (2) minutes have passed.
- h. Decrease air pressure to 3.5 psig greater than any pressure resulting from groundwater over the pipe, where the test pressure equals:

$$3.5 \text{ psi} + (0.43 \text{ psi} \times \text{Depth of Groundwater over Pipe Invert in Feet})$$

- i. Determine elapsed time for the pressure to drop 1.0 psig and use Table 1, or determine the elapsed time for the pressure to drop 0.5 psig from the test pressure and use Table 2.

TABLE 1: Minimum Specified Time Required for a 1.0 psig Pressure Drop

Pipe Dia. (in.)	Min. Time (min:sec)	100 Feet	150 Feet	200 Feet	250 Feet	300 Feet	350 Feet	400 Feet	Time for Longer Pipe Lengths (Seconds)
4	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	.380*L
6	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	.854*L
8	7:34	7:34	7:34	7:34	7:34	7:36	8:52	10:08	1.520*L
10	9:26	9:26	9:26	9:26	9:53	11:52	13:51	15:49	2.374*L
12	11:20	11:20	11:20	11:24	14:15	17:05	19:56	22:47	3.418*L
15	14:10	14:10	14:10	17:48	22:15	26:42	31:09	35:36	5.342*L
18	17:00	17:00	19:13	25:38	32:03	38:27	44:52	51:16	7.692*L

TABLE 2: Minimum Specified Time Required for a 0.5 psig Pressure Drop

Pipe Dia. (in.)	Min. Time (min:sec)	100 Feet	150 Feet	200 Feet	250 Feet	300 Feet	350 Feet	400 Feet	Time for Longer Pipe Lengths (Seconds)
4	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	.190*L
6	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:51	.427*L
8	3:47	3:47	3:47	3:47	3:47	3:48	4:26	5:04	.760*L
10	4:43	4:43	4:43	4:43	4:57	5:56	6:55	7:54	1.187*L
12	5:40	5:40	5:40	5:42	7:08	8:33	9:58	11:24	1.709*L
15	7:05	7:05	7:05	8:54	11:08	13:21	15:35	17:48	2.671*L
18	8:30	8:30	9:37	12:49	16:01	19:14	22:26	25:38	3.846*L

- j. The time interval recorded in the field must be greater than the time listed for the length and pipe diameter being tested and for the pressure drop recorded.
- k. If the pressure drop time is less than that in the appropriate table, for the pipe diameter and the length being tested, the test shall be considered failed.

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- I. No variance in the time allowances shall be granted for the fact that sewer service lines have been installed.
5. Individual service lines need not be tested.
6. In lieu of low-pressure air testing of the sewer system, the Project Engineer may approve a hydrostatic exfiltration testing procedure to test the lines. Approval of the procedure, equipment and basis of acceptance for this testing method will be sent in writing by the Project Engineer prior to the initiation of testing.

**END OF SECTION**

**SECTION 33 31 25  
WASTEWATER FORCE MAIN PIPING**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes installation of wastewater force main piping.

1.02 RELATED WORK

- A. Section 31 23 10 – Excavation, Trenching and Backfill

1.03 REFERENCES

- A. ANSI/AWWA C 900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In., For Water Transmission and Distribution.

1.04 SUBMITTALS

- A. Force Main Pipe
- B. Force Main Fittings

**PART 2 - PRODUCTS**

2.01 FORCE MAIN PIPE

- A. 4" C-900, PVC pressure pipe, DR18
- B. Joints: Factory installed rubber gaskets conforming to ASTM F 477 and bell and spigot ends.
- C. Cell Wall Classification: 1234-B per ASTM D 1784.

2.02 DUCTILE IRON AND PIPE FITTINGS

- A. Ductile Iron Compact Fittings 4 Inch: ANSI/AWWA C 153
- B. Pressure Class 350 psi
- C. External Coating: Asphaltic coating, 1 mil thick minimum.
- D. Internal Coating: 40 mils Protecto 401 ceramic epoxy, or approved substitution.

## 2.03 PIPE LOCATING WIRE AND MARKING TAPE

- A. Locating Wire: No. 12 AWG copper with insulation, spliced with epoxy splice kit.
- B. Marking Tape: 3 inch, green, 4-mil polyethylene marking tape, Labeled: "Caution-Buried Sewer Line Below"

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. All trench-installed piping shall be bedded and backfilled in accordance with Section 31 23 10 – Excavation, Trenching & Backfill.

### 3.02 PRESSURE TEST

- A. Perform testing in the presence of the Engineer
- B. Assure that trench is properly backfilled and thrust blocking has cured to a degree that will allow pressure testing without damage, or pipe/fitting movement.
- C. Gradually fill pipe with water. Expel all air. Sustain a test pressure of 150 psi.
- D. Verify that, in a two-hour test, the pipe does not leak in excess of the allowable leakage as defined by the following formula in which Q is the allowable leakage in gallons/hour.

$$Q = (LD \sqrt{P})/148,000$$

Where Q = allowable leakage in gallons per hour

L = length of pipe section being tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)

### 3.03 AS-BUILTS

- A. Provide as-built information on each system in accordance with General Requirements.

**END OF SECTION**

**SECTION 33 32 13  
PACKAGED WASTEWATER LIFT STATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. The Contractor shall furnish all labor, materials, equipment, and perform all work to furnish and install a complete packaged lift station. The lift station consists of a wet well, valve vault, submersible pumps, slide rails, discharge piping, valves, control panel, and all other components required for a complete packaged lift station. The equipment shall be installed as shown on the plans, as recommended by the supplier, and in compliance with all OSHA, local, state, and federal codes and regulations.

**1.2 REFERENCES**

- A. Equipment shall, as applicable, meet the requirements of the following industry standards:
  - 1. American Iron and Steel Institute (AISI) 304 Stainless Steel
  - 2. American Iron and Steel Institute (AISI) 316 Stainless Steel
- B. Motor controllers shall, as applicable, meet the requirements of the following Regulatory Agencies.
  - 1. National Electrical Manufacturer's Association (NEMA) Standards
  - 2. National Electrical Code (NEC)
  - 3. Underwriters Laboratory (UL and cUL)

**1.3 SUBMITTALS**

- A. In accordance with the requirements of Section 01 33 00, submit the following project data:
  - 1. Manufacturer's technical data and description literature including shop drawings, pump curve, pump construction and materials, pump electrical data, pump and slide rail drawings, control panel wiring diagram, layout drawings, bill of materials, and control panel cut sheets.
  - 2. Operation & Maintenance Manuals including lift station data and drawings, pump manual, control panel wiring diagram and manual, part list of components, complete service procedures, and troubleshooting guide. O&M Manuals shall be submitted prior to shipping.
  - 3. Calculations to demonstrate the design strength of the wet well and valve vault, and factors of safety against structural collapse.

#### 1.4 QUALITY ASSURANCE

1. Qualified suppliers shall have a minimum 5 years' experience at manufacturing packaged lift stations, with a minimum 10 installations of similar equipment. Supplier shall provide a list of names and dates of installations for verification by the Engineer or Owner's Representative.
2. In order to assure uniform quality, ease of maintenance and minimal parts storage, it is the intent of these Specifications that all equipment called for under this Section shall be supplied by a single manufacturer.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Packaged Lift Stations shall be in compliance with these specifications and plans and shall be supplied by one of the following manufacturers:
  1. Automated Flow Systems, supplied by R.C. worst & Co.
  2. Approved equal
- B. Manufacturers requesting to be selected as an approved equal shall submit certified documentation showing compliance with these specifications a minimum of ten (10) calendar days prior to bid opening. Selected equipment manufacturers shall be added to the list of approved manufacturers.
- C. The selected manufacturer must provide a 24 month warranty for the equipment from date of start-up.

#### 2.2 PACKAGED LIFT STATION

##### A. GENERAL

The lift station shall be comprised of a wet well, valve vault, submersible pumps, slide rails, discharge piping, valves, control panel, and all other components required for a complete packaged lift station. All components shall be designed to operate together in a cohesive manner to provide reliable and efficient operation.

##### B. WET WELL AND VALVE VAULT

The Wet Well and Valve Vault shall be constructed of fiberglass reinforced polyester (FRP). The interior surface shall be free of cracks and crazing with a smooth finish. The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. Wet well and Valve Vault shall be water tight, and able to withstand collapse in saturated soil conditions. Any substitution of wet well and valve vault materials must be pre-approved by the Engineer.

Wet Well and Valve Vault bottom shall be constructed with an anti-flotation flange, suitable for use with a poured-in-place concrete anti-flotation ring.

Pipe penetrations shall be sealed with a rubber grommet or boot, or by casting a pipe hub directly into the wall.

Wet Well and Valve Vault shall be equipped with locking access hatches. Hatches shall be constructed of ¼ inch aluminum diamond plate and aluminum frame, and be reinforced to withstand a 300 pound per square foot live load. Hatches shall open to 90 degrees and automatically lock with 316 SST automatic hold-open arm. Hatches shall be equipped with 316 stainless steel hinges, and locking hasps. Unit shall lock with non-corrosive locking bar and handle. Door shall close flush with frame. Access hatch shall be attached to wet well with stainless steel fasteners.

All fasteners and hardware located within wet well shall be 316 stainless steel, fiberglass reinforced polyester or other approved non-corrosive materials suitable for wastewater application.

Wet Well shall be equipped with a float switch bracket, fabricated of series 316 stainless steel. The bracket shall provide a support for the specified float switches and provide strain relief. The bracket shall include a stationary bracket and a removable bracket so the floats may be easily removed for servicing and inspecting.

Splice boxes shall be provided for pump power cords and float switches as specified on the drawings. Unless specified otherwise, two explosion proof splice boxes shall be provided for the pump power cords. Another Nema 4X stainless steel splice box shall be provided for the float switch. Both splice boxes shall have individual conduit connections to the control panel. Float switches shall be intrinsically safe, signal-duty, suspended style switches.

#### C. SUBMERSIBLE PUMPS

Each pump shall be a non-clog submersible centrifugal pump rated at 2.0 hp, 480 volts, three phase, 1750 rpm or 3450 rpm producing 100 gpm at 16.0 ft TDH. The pump shall be non-overloading throughout the entire range of operation without employing service factor. The pump shall have a service factor of 1.20. The pump shall be capable of handling a 3" solid.

The pump shall be protected with compression fittings at power cord entrance.

The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The motor shall be explosion proof, certified for Class 1, Division 1 hazardous environment. The stator windings shall have Class B insulation, and a dielectric oil-filled motor, Nema B design. Further protection shall be provided by winding thermal sensors. The pump motor shall be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped. The pump shall not require cooling water jackets or cooling fins. No special tools shall be required for pump and motor

disassembly. The pump shall be equipped with a seal leak detection probe and warning system.

A stainless steel nameplate shall be provided with each motor and shall be securely fastened thereto. The voltage, speed, insulation class, amperage, service factor, wiring diagram, motor serial number and the manufacturer's name and address shall be steel stamped or otherwise permanently marked.

The pump shall have two mechanical seals, mounted in tandem, with an oil chamber between the seals. The lower seal shall be replaceable without disassembly of the seal chamber and without the use of special tools. The pump shall be equipped with a seal leak detection probe and warning system.

#### Power Cord

The power cord will be SOOW or W, oil and water resistant 600V, 90C, UL and CSA approved and applied per NEC ampacities ratings at the cables rated temperature for intermittent/continuous duty.

#### MANUFACTURERS

1. Hydromatic S4NVX

3. Approved Equal

#### D. DISCHARGE ELBOW

A discharge base elbow, designed to mount directly on the sump floor, shall be supplied for each pump. It shall have a standard 125 pound flange faced and drilled on the outlet side, with a machined mating inlet connection. The design shall be such that the pump to discharge connection is made without the need for any nuts, bolts or gaskets. The base elbow shall also anchor and align the two, 1-1/4" guide rails. The elbow shall be painted with waterborne hybrid acrylic/alkyd paint. This custom engineered, quick dry paint shall provide superior levels of corrosion and chemical protection.

A sealing flange/rail guide bracket shall be mounted on each pump discharge. It shall have a machined mating flange which matches the base elbow discharge connection. Sealing of this discharge connection shall be accomplished by a simple linear downward motion of the pump culminating with the entire weight of the pumping unit supported entirely by the base elbow.

The upper guide bracket shall align and support the two guide rails at the top of the sump. It shall bolt directly to the hatch frame and incorporate an expandable rubber grommet for secure rail installation.

Each pump shall be supplied with a lifting system. The system shall be a stainless steel pump bail, and a stainless steel cable attached using stainless

steel hardware. The cable shall be compatible for use with a portable davit crane. The system supplied must be sized to safely lift the pump weight including an adequate factor of safety. The cable shall be of sufficient length to extend from the pump to a portable davit crane above the wet well.

E. SLIDE RAIL SYSTEM

A slide rail system shall be furnished for each pump, which will direct the pump in proper alignment to automatically connect and seal with the discharge elbow. The slide rail system shall be non-corrosive material, and allow for pumps to slide along the rail without binding. The slide rail system shall allow the pump to be automatically connected to the discharge elbow without need for personnel to enter the wet well vault.

F. DISCHARGE PIPING AND VALVES

All discharge pipe materials, sizes, and configurations shall be constructed as illustrated on the contract drawings. Any substitution of piping materials must be pre-approved by the Engineer.

Gate valves shall be ductile iron bodied with 125 lb ANSI flanged ends. Valves shall have a resilient wedge with non-rising stem.

The check valves shall be ductile iron bodied with 125 lb ANSI flanged end. Check valves shall have a full opening swing style clapper. The clapper shall swing completely clear of the waterway when fully open, permitting full flow through the valve equal to the nominal pipe diameter. The clapper shall include a resilient seat. The clapper shall be mechanically coupled to an external lever and weight.

Two (2) liquid filled pressure gauges with minimum 2.5" diameter dials and 1/4" NPT taps shall be installed on force main connections in control valve vault to allow verification of individual pump operating pressure as shown on contract drawings.

G. CONTROL PANEL

Provide a complete lift station control panel with motor starters, operator interface devices, and appurtenances installed in a single NEMA 4 steel enclosure, Automated Flow Systems SL series or approved equal. The pump control panel shall comply with U.L. Standards 508A and 698A.

The enclosure shall be NEMA 4 painted steel with provisions for padlocking. All operator interface devices shall be located on an inner door, unless otherwise indicated. Each pump shall have a hand-off-auto switch and a run light.

A main circuit breaker shall be used to protect from line faults and to disconnect the control panel from the incoming power. Individual circuit breakers shall be provided for each pump. Circuit breakers shall be thermal

magnetic and sized to meet NEC requirements for motor controls. IEC rated magnetic starter shall include an overload relays sized to match the pump horsepower.

The pump panel shall have inputs for 2 normally open float switches; they shall be: Pumps Off, and High Level. High Level float shall be located in the Flow Control Vault, remotely from the wet well. Intrinsically safe relays shall be provided for float inputs. The pump panel shall have seal fail relays for connecting each pump motor seal fail (moisture) sensors. The relays shall measure the resistance between the moisture probes. When the resistance falls below acceptable level, the seal fail LED for the specified pump motor and the seal fail relay output shall activate. This shall not disable the pump. The pump panel shall have an input for connecting each pumps motor heat sensor. Should this input sense an open circuit to ground, the temp fail light will illuminate and the corresponding pump shall be disabled.

The control panel shall have an LED alarm beacon that activates when the low level float closes or on motor high temperature, or motor overload. This indicator shall be red. In addition to the alarm LED, there shall also be an alarm test pushbutton on the panel interior door that, when pressed, simulates an alarm condition, activates the external alarm light, and sounds the audible alarm.

In Auto mode, the pumps shall be inhibited from running if the Pumps Off (low level) float, or High Level float in the Flow Control Vault is activated. Motor overload or pump high temperature shall inhibit the affected pump from running in Hand or Auto modes.

Additional control panel features shall include:

1. 'Power on' indicator light,
2. Elapsed time meter, (per pump)
3. Cycle counter (per pump).
4. Anti-condensate heater with thermostat.
5. UL listed Intrinsically safe circuit extensions for floats
6. 120 VAC, 15amp GFCI convenience outlet with circuit breaker
7. Overload lights and overload reset pushbuttons (per pump)
8. Lighting arrestor
9. Surge Suppressor
10. Labeled indicating lights, for each float
11. Control power transformer and three (3) spare fuses

12. Two (2) spare control relays
13. Five (5) spare terminals

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

The excavation shall be prepared according to the project drawings and manufacturer's instructions. A properly compacted base shall be provided. The contractor shall place the packaged lift station into the excavation using care not to damage the assembly from lifting stresses or impacts. A concrete anti-flotation ring shall be provided as shown on the project drawings. Backfill with suitable material and compaction.

#### **3.2 START-UP AND TRAINING**

The initial start-up shall be performed by an authorized representative of the packaged lift station supplier. The representative shall inspect the installation, supervise the start-up, and instruct the owner's personnel in the proper operation and maintenance procedures for the entire packaged lift station. Four hours of training shall be provided. The contractor shall advise the project engineer and representative 14 calendar days prior to commencing start-up. Contractor shall provide four (4) copies of all training materials to Town staff a minimum of 14 days prior to startup and training. A minimum of four hours shall be allowed for start-up and training. If the system is not operational the contractor shall be responsible for rescheduling and additional costs for representative to return.

#### **3.3 ELECTRICAL SERVICE CONNECTION**

Contractor shall furnish materials, equipment, and labor to provide electrical service to the packaged lift station control panel, including all conduit and wire. All coordination with the utility and inspectors, and all required permits will be incidental. The installation must be in compliance with all applicable codes.

**END OF SECTION**

**SECTION 33 38 10  
BASIN LINER**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. This section includes furnishing and installing a High Density Polyethylene (HDPE) geomembrane liner.

1.02 RELATED WORK

- A. Section 31 22 10 – Site Grading
- B. Section 31 24 10 – Embankment and Engineered Fill

1.03 REFERENCES

- A. ASTM D638 – Tensile properties of plastics
- B. ASTM D792 – Density of plastics
- C. ASTM D1004 – Tear Strength
- D. ASTM D1603 – Carbon Black Content
- E. ASTM D4437 – Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
- F. ASTM D4759 - Standard Practice for Determining the Specification Conformance of Geosynthetics
- G. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
- H. ASTM D5199 – Standard Test Method for Measuring the Nominal Thickness of Geotextiles and Geomembranes
- I. ASTM D5397 – Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
- J. ASTM D5596 – Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
- K. ASTM D5641 – Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber
- L. ASTM D5820 - Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes

- M. ASTM D5885 – Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry
- N. ASTM D6365 – Standard Practice for the Nondestructive Testing of Geomembrane Seams using the Spark Test
- O. ASTM D6392 - Test Method for Determining Integrity on Non-reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
- P. ASTM D6693 - Determining Tensile Properties of Non-reinforced Polyethylene and Non-reinforced Flexible Polypropylene Geomembranes
- Q. GRI GM 9, Cold Weather Seaming of Geomembranes
- R. GRI GM 10, The Stress Crack Resistance of HDPE Geomembrane Sheet
- S. GRI GM 13, Test Properties, Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
- T. GRI GM 14, Test Frequencies for Destructive Seam Testing Selecting, variable intervals for taking geomembrane destructive samples using the method of attributes.
- U. GRI GM 17, Test Methods, Test Properties and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes
- V. GRI GM 19, Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.
- W. GRI GM 20, Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using Control Charts.

#### 1.04 SUBMITTALS

- A. Documentation of manufacturer's qualifications.
- B. Manufacturer's Quality Control program manual or descriptive documentation.
- C. A material properties sheet, including at a minimum all properties specified in GRI GM 13 or GRI GM 17, including test methods used.
- D. Sample of the material.
- E. Documentation of Installer's qualifications:
  - 1) Submit a list of at least ten completed facilities. For each installation, provide: name and type of facility; its location; the date of installation;

## PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

- name and telephone number of contact at the facility; type and thickness of geomembrane and; surface area of the installed geomembrane.
- 2) Submit resumes or qualifications of the Installation Supervisor, Master Seamer and IAGI Certified Welding Technicians (CWTs) to be assigned to this project.
  - 3) Quality Control Program.

### F. Example Material Warranty and Liner Installation Warranty.

#### 1.05 SHOP DRAWINGS

- A. Submit copies of shop drawings for engineer's approval within a reasonable time so as not to delay the start of geomembrane installation. Shop drawings shall show the proposed panel layout identifying seams and details. Seams should generally follow the direction of the slope. Butt seams or roll-end seams should not occur on a slope unless approved by the Owner's Representative. Butt seams on a slope, if allowed, should be staggered.
- B. Placement of geomembrane should not be allowed to proceed until Owner's Representative has received and approved the shop drawings.

#### 1.06 ADDITIONAL SUBMITTALS

- A. Manufacturer's warranty.
- B. Geomembrane installation warranty.
- C. Daily written acceptance of subgrade surface.
- D. Low-temperature seaming procedures if applicable.
- E. Prequalification test seam samples.
- F. Field seam non-destructive test results.
- G. Field seam destructive test results.
- H. Daily field installation reports.
- I. Installation record drawing.

#### 1.07 QUALITY CONTROL

- A. Manufacturer's Qualifications: The manufacturer of geomembrane of the type specified or similar product shall have at least five years experience in the manufacture of such geomembrane. In addition, the geomembrane manufacturer shall have manufactured at least 1,000,000 M<sup>2</sup> (10,000,000 FT<sup>2</sup>) of the specified type of geomembrane or similar product during the last five years.

B. Installer's Qualifications

- 1) The Geomembrane Installer shall be the Manufacturer, approved Manufacturer's Installer or a contractor approved by the Owner's Representative to install the geomembrane.
- 2) The Geomembrane Installer shall have at least three years experience in the installation of the specified geomembrane or similar. The Geomembrane Installer shall have installed at least 10 projects involving a total of 500,000 M<sup>2</sup> (5,000,000 FT<sup>2</sup>) of the specified type of geomembrane or similar during the last three years.
- 3) Installation shall be performed under the direction of a field Installation Supervisor who shall be responsible throughout the geomembrane installation, for geomembrane panel layout, seaming, patching, testing, repairs, and all other activities of the Geomembrane Installer. The Field Installation Supervisor shall have installed or supervised the installation and seaming of a minimum of 10 projects involving a total of 500,000 M<sup>2</sup> (5,000,000 FT<sup>2</sup>) of geomembrane of the type specified or similar product.
- 4) Seaming shall be performed under the direction of a Master Seamer (who may also be the Field Installation Supervisor or Crew Foreman) who has seamed a minimum of 300,000 M<sup>2</sup> (3,000,000 FT<sup>2</sup>) of geomembrane of the type specified or similar product, using the same type of seaming apparatus to be used in the current project. The Field Installation Supervisor and/or Master Seamer shall be present whenever seaming is performed.
- 5) All seaming, patching, other welding operations, and testing shall be performed by qualified technicians employed by the Geomembrane Installer.

1.08 DELIVERY, STORAGE & HANDLING

- A. Each roll of geomembrane delivered to the site shall be labeled by the manufacturer. The label shall be firmly affixed and shall clearly state the manufacturer's name, product identification, material thickness, roll number, roll dimensions and roll weight.
- B. Geomembrane shall be protected from mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.
- C. Rolls shall be stored away from high traffic areas. Continuously and uniformly support rolls on a smooth, level prepared surface.

1.09 PROJECT CONDITIONS

## PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

- A. Geomembrane shall not be installed in the presence of standing water, while precipitation is occurring, during excessive winds, or when material temperatures are outside the limits specified in Section 3.03.

### 1.10 ACCEPTANCE

- A. The Work will not be accepted until satisfactory testing and clean up is complete.
- B. If the Work does not meet the specified requirements of this section and related sections, repair, replace, and retest at no additional cost.

### 1.11 WARRANTY

- A. As agreed by project participants
- B. The Geomembrane Installer shall guarantee the geomembrane installation against defects in the installation and workmanship for 1 year commencing with the date of final acceptance.

## **PART 2 - PRODUCTS**

### 2.01 SOURCE QUALITY CONTROL

- A. Manufacturing Quality Control
  - 1. The test methods and frequencies used by the manufacturer for quality control/quality assurance of the above geomembrane prior to delivery, shall be in accordance with GRI GM 13 for HDPE geomembrane.
  - 2. The manufacturer's geomembrane quality control certifications, including results of quality control testing of the products, must be supplied to the Owner's Representative to verify that the materials supplied for the project are in compliance with all product and or project specifications in this Section. The certification shall be signed by a responsible party employed by the manufacturer, such as the QA/QC Manager, Production Manager, or Technical Services Manager. Certifications shall include lot and roll numbers and corresponding shipping information.
  - 3. The Manufacturer will provide Certification that the geomembrane and welding rod supplied for the project are made from the same material type and are compatible.

### 2.02 GEOMEMBRANE

PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

A. The geomembrane shall consist of new, first quality products designed and manufactured specifically for the purpose of this work which shall have been satisfactorily demonstrated by prior testing to be suitable and durable for such purposes. The geomembrane rolls shall be seamless, high density polyethylene (HDPE - Formulated Sheet Density  $\geq$  0.940g/cc) containing no plasticizers, fillers or extenders and shall be free of holes, blisters or contaminants, and leak free verified by 100% in line spark or equivalent testing. The geomembrane shall be supplied as a continuous sheet with no factory seams in rolls. The geomembrane will meet the property requirements of GRI GM 13.

B. Material conformance testing by the Owner's Representative, if required, will be conducted using in-plant sampling or as specified for the project.

C. The geomembrane shall meet the following property requirements:

- |                                       |            |
|---------------------------------------|------------|
| 1. Nominal Thickness:                 | 60 mils    |
| 2. Formulated Density                 | 0.940 g/cc |
| 3. Tensile Properties                 |            |
| a. Yield Strength:                    | 126 lb/in  |
| b. Break Strength                     | 228 lb/in  |
| c. Yield Elongation                   | 12%        |
| d. Break Elongation                   | 700%       |
| 4. Tear Resistance                    | 42 lb      |
| 5. Puncture Resistance                | 108 lb     |
| 6. Stress Crack Resistance            | 500 hr     |
| 7. Carbon Black Content               | 2.0-3.0%   |
| 8. Oxidative Induction Time, Standard | 100 min.   |
| 9. Oxidative Induction Time, Hi Press | 400 min.   |
| 10. UV Resistance (High Pressure OIT) | 50%        |
| 11. Hot Wedge Seams                   |            |
| a. Shear Strength:                    | 120 lb/in  |
| b. Shear elongation at break          | 50%        |
| c. Peel Strength                      | 91 lb/in   |
| d. Peel Separation                    | 25%        |
| 12. Extrusion Fillet Seams            |            |

a. Shear Strength:	120 lb/in
b. Shear elongation at break	50%
c. Peel Strength	78 lb/in
d. Peel Separation	25%

### **PART 3 - EXECUTION**

#### **3.01 SUBGRADE PREPARATION**

- A. The subgrade shall be prepared in accordance with the project drawings and specifications. The geomembrane subgrade shall be uniform and free of sharp or angular objects that may damage the geomembrane prior to installation of the geomembrane.
- B. The Geomembrane Installer and Owner's Representative shall inspect the surface to be covered with the geomembrane on each day's operations prior to placement of geomembrane to verify suitability.
- C. The Geomembrane Installer and Owner's Representative shall provide daily written acceptance for the surface to be covered by the geomembrane in that day's operations. The surface shall be maintained in a manner, during geomembrane installation, to ensure subgrade suitability.
- D. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to placement of the geomembrane. All repairs shall be approved by the Owner's Representative and the Geomembrane Installer. This damage, repair, and the responsibilities of the contractor and Geomembrane Installer shall be defined in the preconstruction meeting.

#### **3.02 GEOMEMBRANE PLACEMENT**

- A. No geomembrane shall be deployed until the applicable certifications and quality control certificates are submitted to and approved by the Owner's Representative within the timeframe specified in the contract documents. If the material does not meet project specifications it shall be removed from the work area.
- B. The geomembrane shall be installed to the limits shown on the project drawings and essentially as shown on approved panel layout drawings.
- C. No geomembrane material shall be unrolled and deployed if the material temperatures are lower than 0 degrees C (32 degrees F) unless otherwise approved by the Owner's Representative. Typically,

only the quantity of geomembrane that will be anchored and seamed together in one day should be deployed.

- D. No vehicular traffic shall travel on the geomembrane other than an approved low ground pressure vehicle or equivalent.
- E. Sandbags or equivalent ballast shall be used as necessary to temporarily hold the geomembrane material in position under the foreseeable and reasonably expected wind conditions. Sand bag material shall be sufficiently close-knit to prevent soil fines from working through the bags and discharging on the geomembrane.
- F. Geomembrane placement shall not be done if moisture prevents proper subgrade preparation, panel placement, or panel seaming.
- G. Damaged panels or portions of the damaged panels which have been rejected shall be marked and their removal from the work area recorded.
- H. The geomembrane shall not be allowed to "bridge over" voids or low areas in the subgrade. The geomembrane shall rest in intimate contact with the subgrade.
- I. Wrinkles caused by panel placement or thermal expansion shall be minimized.
- J. Considerations on site geometry: In general, seams shall be oriented parallel to the line of the maximum slope. In corners and odd shaped geometric locations, the total length of field seams shall be minimized. Seams shall not be located at low points in the subgrade unless geometry requires seaming at such locations and if approved by the Owner's Representative.
- K. Overlapping: The panels shall be overlapped prior to seaming to whatever extent is necessary to affect a good weld and allow for proper testing. In no case shall this overlap be less than 3 in.

### 3.03 SEAMING PROCEDURES

- A. Cold weather installations should follow guidelines as outlined in GRI GM9.
- B. No geomembrane material shall be seamed when liner temperatures are less than 0 degrees C (32 degrees F) unless the following conditions are complied with:
  - 1. Seaming of the geomembrane at material temperatures below 0 degrees C (32 degrees F) is allowed if the Geomembrane Installer can demonstrate to the Owner's Representative, using pre-qualification test seams, that field seams comply with the project

## PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

specifications, the safety of the crew is ensured, and geomembrane material can be fabricated (i.e. pipeboots, penetrations, repairs. etc.) at subfreezing temperatures.

2. The Geomembrane Installer shall submit to the Owner's Representative for approval, detailed procedures for seaming at low temperatures, possibly including the following:
  - a. Preheating of the geomembrane.
  - b. The provision of a tent or other device if necessary to prevent heat losses during seaming and rapid heat losses subsequent to seaming.
  - c. Number of test welds to determine appropriate seaming parameters.
- C. No geomembrane material shall be seamed when the sheet temperature is above 75 degrees C (170 degrees F) as measured by an infrared thermometer or surface thermocouple unless otherwise approved by the Owner's Representative. This approval will be based on recommendations by the manufacturer and on a field demonstration by the Geomembrane Installer using prequalification test seams to demonstrate that seams comply with the specification.
- D. Seaming shall primarily be performed using automatic fusion welding equipment and techniques. Extrusion welding shall be used where fusion welding is not possible such as at pipe penetrations, patches, repairs and short (less than a roll width) runs of seams.
- E. Fishmouths or excessive wrinkles at the seam overlaps shall be minimized and when necessary cut along the ridge of the wrinkles back into the panel so as to effect a flat overlap. The cut shall be terminated with a keyhole cut (nominal 10 mm (1/2 in) diameter hole) so as to minimize crack/tear propagation. The overlay shall subsequently be seamed. The key hole cut shall be patched with an oval or round patch of the same base geomembrane material extending a minimum of 150 mm (6 in.) beyond the cut in all directions..

### 3.04 PIPE AND STRUCTURE PENETRATION SEALING SYSTEM

- A. Provide penetration sealing system as shown in the Project Drawings.
- B. Penetrations shall be constructed from the base geomembrane material, flat stock, prefabricated boots and accessories as shown on the Project Drawings. The pre-fabricated or field fabricated assembly shall be field welded to the geomembrane as shown on the Project Drawings so as to prevent leakage. This assembly shall be tested as

outlined in section 3.05.B. Alternatively, where field non-destructive testing cannot be performed, attachments will be field spark tested by standard holiday leak detectors in accordance with ASTM 6365.

- C. Spark testing should be done in areas where both air pressure testing and vacuum testing are not possible.
  - 1. Equipment for spark testing shall be comprised of but not limited to a hand held holiday spark tester and conductive wand that generates a high voltage.
  - 2. The testing activities shall be performed by the Geomembrane Installer by placing an electrically conductive tape or wire beneath the seam prior to welding. A trial seam containing a non-welded segment shall be subject to a calibration test to ensure that such a defect (non- welded segment) will be identified under the planned machine settings and procedures. Upon completion of the weld, enable the spark tester and hold approximately 25mm (1 in) above the weld moving slowly over the entire length of the weld in accordance with ASTM 6365. If there is no spark the weld is considered to be leak free.
  - 3. A spark indicates a hole in the seam. The faulty area shall be located, repaired and retested by the Geomembrane Installer.
  - 4. Care should be taken if flammable gases are present in the area to be tested.

### 3.05 FIELD QUALITY CONTROL

#### A. General:

- 1. The Owner's Representative shall be notified prior to all pre-qualification and production welding and testing.

#### B. Prequalification Test Seams

- 1. Test seams shall be prepared and tested by the Geomembrane Installer to verify that seaming parameters (speed, temperature and pressure of welding equipment) are adequate.
- 2. Test seams shall be made by each welding technician and tested in accordance with ASTM D 4437 at the beginning of each seaming period. Test seaming shall be performed under the same conditions and with the same equipment and operator combination as production seaming. The test seam shall be approximately 10 feet long for fusion welding and 3 feet long for extrusion welding with the seam centered lengthwise. At a minimum, tests seams should be made by each technician 1 time every 4–6 hours; additional tests may be required with changes in environmental conditions.

3. Two 1 in wide specimens shall be die-cut by the Geomembrane Installer from each end of the test seam. These specimens shall be tested by the Geomembrane Installer using a field tensiometer testing both tracks for peel strength and also for shear strength. Each specimen should fail in the parent material and not in the weld, "Film Tear Bond"(F.T.B. failure). Seam separation equal to or greater than 25% of the track width shall be considered a failing test.
  4. The minimum acceptable seam strength values to be obtained for all specimens tested are listed in Subsection 2.02.C. of this Section. Four specimens shall pass and the fifth specimen must meet or exceed 80% of the required seam strength for the test seam to be a passing seam.
  5. If a test seam fails, an additional test seam shall be immediately conducted. If the additional test seam fails, the seaming apparatus shall be rejected and not used for production seaming until the deficiencies are corrected and a successful test seam can be produced.
  6. A sample from each test seam shall be labeled. The label shall indicate the date, geomembrane temperature, number of the seaming unit, technician performing the test seam and pass or fail description. The sample shall then be given to the Owner's Representative for archiving.
- C. Field Seam Non-Destructive Testing
1. All field seams shall be non-destructively tested by the Geomembrane Installer over the full seam length before the seams are covered. Each seam shall be numbered or otherwise designated. The location, date, test unit, name of tester and outcome of all non-destructive testing shall be recorded and submitted to the Owner's Representative.
  2. Testing should be done as the seaming work progresses, not at the completion of all field seaming, unless agreed to in advance by the Owner's Representative. All defects found during testing shall be numbered and marked immediately after detection. All defects found should be repaired, retested and remarked to indicate acceptable completion of the repair.
  3. Non-destructive testing shall be performed using vacuum box, air pressure or spark testing equipment.
  4. Non-destructive tests shall be performed by experienced technicians familiar with the specified test methods. The Geomembrane Installer shall demonstrate to the Owner's Representative all test methods to verify the test procedures are valid.

PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

5. Extrusion seams shall be vacuum box tested by the Geomembrane Installer in accordance with ASTM D 4437 and ASTM D 5641 with the following equipment and procedures:
  - a. Equipment for testing extrusion seams shall be comprised of but not limited to: a vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the base, port hole or valve assembly and a vacuum gauge; a vacuum pump assembly equipped with a pressure controller and pipe connections; a rubber pressure/vacuum hose with fittings and connections; a plastic bucket; wide paint brush or mop; and a soapy solution
  - b. The vacuum pump shall be charged and the tank pressure adjusted to approximately 35 kPa (5 psig).
  - c. The Geomembrane Installer shall create a leak tight seal between the gasket and geomembrane interface by wetting a strip of geomembrane approximately 0.3m (12 in) by 1.2m (48 in) (length and width of box) with a soapy solution, placing the box over the wetted area, and then compressing the box against the geomembrane. The Geomembrane Installer shall then close the bleed valve, open the vacuum valve, maintain initial pressure of approximately 35 kPa (5 psig) for approximately five (5) seconds. The geomembrane should be continuously examined through the viewing window for the presence of soap bubbles, indicating a leak. If no bubbles appear after five (5) seconds, the area shall be considered leak free. The box shall be depressurized and moved over the next adjoining area with an appropriate overlap and the process repeated.
  - d. All areas where soap bubbles appear shall be marked, repaired and then retested.
  - e. At locations where seams cannot be nondestructively tested, such as pipe penetrations, alternate nondestructive spark testing (as outlined in section 3.04.C) or equivalent should be substituted.
  - f. All seams that are vacuum tested shall be marked with the date tested, the name of the technician performing the test and the results of the test.
6. Double Fusion seams with an enclosed channel shall be air pressure tested by the Geomembrane Installer in accordance with ASTM D 5820 and ASTM D 4437 and the following equipment and procedures:

## PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

- a. Equipment for testing double fusion seams shall be comprised of but not limited to: an air pump equipped with a pressure gauge capable of generating and sustaining a pressure of 210 kPa (30 psig), mounted on a cushion to protect the geomembrane; and a manometer equipped with a sharp hollow needle or other approved pressure feed device.
  - b. The testing activities shall be performed by the Geomembrane Installer. Both ends of the seam to be tested shall be sealed and a needle or other approved pressure feed device inserted into the tunnel created by the double wedge fusion weld. The air pump shall be adjusted to a pressure of 210 kPa (30 psig), and the valve closed. Allow two (2) minutes for the injected air to come to equilibrium in the channel, and sustain pressure for five (5) minutes. If pressure loss does not exceed 28 kPa (4 psig) after this five minute period the seam shall be considered leak tight. Release pressure from the opposite end verifying pressure drop on needle to ensure testing of the entire seam. The needle or other approved pressure feed device shall be removed and the feed hole sealed.
  - c. If loss of pressure exceeds 28 kPa (4 psig) during the testing period or pressure does not stabilize, the faulty area shall be located, repaired and retested by the Geomembrane Installer.
  - d. Results of the pressure testing shall be recorded on the liner at the seam tested and on a pressure testing record.
- D. Destructive Field Seam Testing
1. One destructive test sample per 150 linear m (500 linear ft) seam length or another predetermined length in accordance with GRI GM14 or GRI GM20 shall be taken by the Geomembrane Installer from a location specified by the Owner's Representative. The Geomembrane Installer shall not be informed in advance of the sample location. In order to obtain test results prior to completion of geomembrane installation, samples shall be cut by the Geomembrane Installer as directed by the Owner's Representative as seaming progresses.
  2. All field samples shall be marked with their sample number and seam number. The sample number, date, time, location, and seam number shall be recorded. The Geomembrane Installer shall repair all holes in the geomembrane resulting from obtaining the seam samples. All patches shall be vacuum box tested or spark tested. If a patch cannot be permanently installed over the test location the same day of sample collection, a temporary patch shall be tack welded or hot air welded over the opening until a permanent patch can be affixed.

3. The destructive sample size shall be 300 mm (12 in) wide by 1 m (36 in) long with the seam centered lengthwise. The sample shall be cut into three equal sections and distributed as follows: one section given to the Owner's Representative as an archive sample; one section given to the Owner's Representative for laboratory testing as specified in paragraph 5 below; and one section retained by the Geomembrane Installer for field testing as specified in paragraph 4 below.
  4. For field testing, the Geomembrane Installer shall cut 10 identical 25 mm (1 in) wide replicate specimens from the sample. The Geomembrane Installer shall test five specimens for seam shear strength and five for peel strength. Peel tests will be performed on both inside and outside weld tracks. To be acceptable, 4 of 5 test specimens must pass the stated criteria in section 2.02 with less than 25% separation. The fifth specimen must meet or exceed 80% of the required seam strength.
  5. If independent seam testing is required by the specifications it shall be conducted in accordance with ASTM 5820 or ASTM D4437.
  6. Reports of the results of examinations and testing shall be prepared and submitted to the Owner's Representative.
  7. For field seams, if a laboratory test fails, that shall be considered as an indicator of the possible inadequacy of the entire seamed length corresponding to the test sample. Additional destructive test portions shall then be taken by the Geomembrane Installer at locations indicated by the Engineer; typically 3 m (10 ft.) on either side of the failed sample and laboratory seam tests shall be performed. Passing tests shall be an indicator of adequate seams. Failing tests shall be an indicator of non-adequate seams and all seams represented by the destructive test location shall be repaired seams shall be inspected by the Installer and Owner's Representative during and after panel deployment to identify all defects, including holes, blisters, with a cap-strip extrusion welded to all sides of the capped area. All cap-strip seams shall be non-destructively vacuum box tested until adequacy of the seams is achieved. Cap strip seams exceeding 50 M in length (150 FT) shall be destructively tested.
- E. Identification of Defects
1. Panels and seams shall be inspected by the Installer and Owner's Representative during and after panel deployment to identify all defects, including holes, blisters, undispersed raw materials and signs of contamination by foreign matter.
- F. Evaluation of Defects

## PLUMMER COMMUNITY WASTEWATER SYSTEM IMPROVEMENTS

1. Each suspect location on the liner (both in geomembrane seam and non-seam areas) shall be non-destructively tested using one of the methods described in Section 3.05.C. Each location which fails non-destructive testing shall be marked, numbered, measured and posted on the daily "installation" drawings and subsequently repaired.
  2. If a destructive sample fails the field or laboratory test, the Geomembrane Installer shall repair the seam between the two nearest passed locations on both sides of the failed destructive sample location.
  3. Defective seams, tears or holes shall be repaired by re-seaming or applying an extrusion welded cap strip.
  4. Reseaming may consist of either:
    - a. Removing the defective weld area and rewelding the parent material using the original welding equipment; or
    - b. Reseaming by extrusion welding along the overlap at the outside seam edge left by the fusion welding process.
  5. Blisters, larger holes, and contamination by foreign matter shall be repaired by patches and/or extrusion weld beads as required. Each patch shall extend a minimum of 150 mm (6 in) beyond all edges of the defects.
  6. All repairs shall be measured, located and recorded.
- G. Verification of Repairs on Seams
1. Each repair shall be non-destructively tested using either vacuum box or spark testing methods. Tests which pass the non-destructive test shall be taken as an indication of a successful repair. Failed tests shall be reseamed and retested until a passing test results. The number, date, location, technician and test outcome of each patch shall be recorded.
- H. Daily Field Installation Reports: At the beginning of each day's work, the Installer shall provide the Engineer with daily reports for all work accomplished on the previous work day. Reports shall include the following:
1. Total amount and location of geomembrane placed;
  2. Total length and location of seams completed, name of technicians doing seaming and welding unit numbers;
  3. Drawings of the previous day's installed geomembrane showing panel numbers, seam numbers and locations of non-destructive and destructive testing;
  4. Results of pre-qualification test seams;

5. Results of non-destructive testing; and
  6. Results of vacuum testing of repairs.
- I. Destructive test results shall be reported prior to covering of liner or within 48 hours.

### 3.06 LINER ACCEPTANCE

- A. Geomembrane liner will be accepted by the Owner's Representative when:
1. The entire installation is finished or an agreed upon subsection of the installation is finished;
  2. All Installer's QC documentation is completed and submitted to the owner;
  3. Verification of the adequacy of all field seams and repairs and associated geomembrane testing is complete.

### 3.07 ANCHOR TRENCH

- A. Construct as specified on the project drawings.

### 3.08 DISPOSAL OF SCRAP MATERIAL

- A. On completion of installation, the Geomembrane Installer shall dispose of all trash and scrap material in a location approved by the Owner, remove equipment used in connection with the work herein, and shall leave the premises in a neat acceptable manner. No scrap material shall be allowed to remain on the geomembrane surface.

**END OF SECTION**

# **PART 7**

## **ELECTRICAL TECHNICAL SPECIFICATIONS**



1130 W. Hayden Ave, Suite 101  
Hayden, ID 83835  
208|676-8001 208|676-0100 Fax

**SPECIFICATION STAMP PAGE**

DATE: March 8, 2019

CLIENT: Century West Engineering  
1110 West Park Place  
Suite 303  
Coeur d'Alene, ID 83814

PROJECT: Indian Health Service  
Plummer Community  
Wastewater System  
Improvements

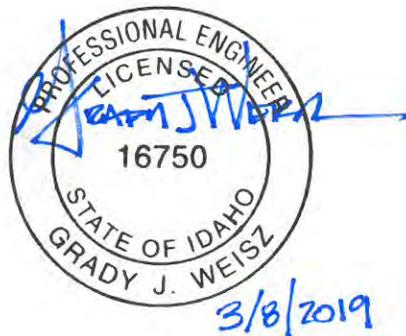
PROJECT#: 18331

ENGINEER: Grady J. Weisz, P.E.

**Section**                      **Specification Description**

26 00 00	ELECTRICAL GENERAL PROVISIONS
26 00 01	ELECTRICAL SCOPE OF WORK
26 00 02	BASIC MATERIAL AND METHODS
26 01 26	ELECTRICAL TESTING
26 05 19	WIRE AND CABLE
26 05 26	GROUNDING
26 05 33	RACEWAYS
26 70 00	MOTORS
26 90 25	CONTROL COMPONENTS

The technical specification sections listed above have been prepared under the direction of the Professional Engineer, registered in the State of Idaho, whose seal and signature appear below:



**SECTION 26 60 00**  
**ELECTRICAL GENERAL PROVISIONS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Contract requirements
- B. Codes, permits and fees
- C. Quality assurance and standards
- D. Site visit and familiarization
- E. Submittals
- F. Coordination of electrical work
- G. Material and workmanship
- H. Space requirements
- I. Safety regulations
- J. Delivery, storage and handling of materials

**1.2 RELATED SECTIONS**

- A. Related Sections include but are not necessarily limited to:
  - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
  - 2. Division 1 - General Requirements.

**1.3 STANDARDS AND REFERENCES**

- A. Refer to Division 1 for general administrative/procedural requirements related to compliance with applicable standards.
- B. This Work and all materials shall meet the standards set forth in the applicable portions of the following recognized standards:
  - 1. ANSI – American National Standards Institute.
  - 2. ASHRAE – American Society of Heating Refrigerating & Air-Conditioning Engineers.
  - 3. ASME – American Society of Mechanical Engineers.
  - 4. ASPE – American Society of Plumbing Engineers.
  - 5. ASTM – American Society for Testing and Materials.
  - 6. CBM – Certified Ballast Manufacturers.
  - 7. ETL – Electrical Testing Laboratory.
  - 8. FM – Factory Mutual Engineering Corporation.
  - 9. IEEE – Institute of Electrical and Electronics Engineers.
  - 10. IES – Illuminating Engineering Society of North America.
  - 11. NEC – National Electric Code (by NFPA).
  - 12. NEMA – National Electrical Manufacturers Association.
  - 13. NFPA – National Fire Protection Association.
  - 14. UL – Underwriters' Laboratories Inc.

**1.4 SUBMITTALS**

- A. General: Submittals required for this project shall include, but are not be limited to:
  - 1. Shop Drawings and Product Brochure Submittals.
  - 2. Record (as-installed) Drawings.
  - 3. Certifications and Test Reports.
  - 4. Operating and Maintenance Manuals.
  - 5. Warranties (Guarantees).
  - 6. Refer to Division 1 for additional submittal requirements.
- B. Shop Drawings and Product Brochure Submittals:
  - 1. The terms "Submittal" and "Shop Drawing" in this Specification are defined as either product literature, samples of equipment, or actual Shop Drawings.
  - 2. The Contractor shall submit a minimum of six (6) complete bound sets of Shop Drawings and complete data covering each item or equipment or material. The Owner and Engineer will each retain one (1) copy of all Shop Drawing submittals for their files. Where full size Drawings are involved, submit two (2) prints and one (1) reproducible in lieu of six (6) sets.
  - 3. Submittals shall be provided with a cover sheet with the names and addresses of the Project, Engineer, General Contractor, and the Subcontractor making the submittal. The cover sheet shall also contain the Specification section number applicable to the item or items submitted, the item nomenclature and description and a submittal number. Electrical submittals shall be numbered sequentially by Specification section with a sequence suffix (e.g. 26 05 19-1, 26 06 33-2, etc.). Re-submittals shall be numbered with the original submittal number plus an "R" in the sequence suffix (e.g. the re-submittals of submittal 26 05 19-1 would be 26 05 19-1R1, 26 05 19-1R2).
  - 4. Submittals shall be provided with an index page with a listing of all data included in the submittal.
  - 5. Submittals shall be provided with a list of variations, including unfurnished or additional items or features between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "No Variations". Where variations affect the work of other contractors, then the contractor shall certify on this page that these variations have been fully coordinated with the affected contractors and that the submitting contractor shall pay all additional costs to the affected contractors associated with the variations.
  - 6. Submittals shall provide equipment information including manufacturer's name and designation, size, performance and capacity data. All applicable listings, labels, approvals and standards shall be clearly indicated.
  - 7. Submittals shall provide dimensional data and actual sketches as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances.
  - 8. Submittals shall include an identification of each item of material or equipment matching that indicated on the Drawings.
  - 9. Submittals shall provide sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method. Any non-applicable information shall be crossed out.
  - 10. Submittals shall include additional information as required in other sections of this Division.
  - 11. Submittals shall include certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Contract Documents signed and dated.

## ELECTRICAL GENERAL PROVISIONS

12. Reports or information requiring certification shall be certified by an authorized officer of the manufacturer or testing agency.
  13. Submittals shall include Certified Shop Drawings showing dimensions, loading details, anchor bolt locations, and inserts required for each piece of equipment set on concrete in sufficient time to cause no delay in the Work.
  14. Equipment and material submittals shall show sufficient data including all performance data, recommended installation details, and sufficient data to indicate complete compliance with the Contract Documents, including proper sizes, clearances, capacities, materials, and finishes.
- C. Required Shop Drawing Submittals:
1. Submittal Shop Drawings, including, but not limited to the following items.
  2. Wire and Cable ..... See Section 26 05 19.
  3. Grounding ..... See Section 26 05 26.
  4. Raceways..... See Section 26 05 33.
  5. Motor ..... See Section 26 70 00.
  6. Controls Components ..... See Section 26 90 25.
  7. Coordination Drawings as required by this Section.
  8. As-Built Drawings.
- D. Shop Drawing Submittal Review:
1. Shop Drawings will be reviewed for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown in review comments is subject to the requirements of the Contract Documents. The submitting Contractor is responsible for: dimensions that shall be confirmed at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.
- E. Certifications and Test Reports:
1. The Engineer may, at their discretion, witness any or all on and off site acceptance and operational testing. Submit a detailed listing of certification and testing for each system indicating estimated dates for completion of system installation.
  2. Test procedures and test result reporting forms shall be submitted for review no later than the date of the certification and testing listing submittal.
  3. Submit four copies (coordinate with commissioning requirements) of all certifications and test reports to the Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.
  4. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section 26 01 26 - Electrical Testing.
  5. Notify the Engineer in writing one week prior to all scheduled testing to allow time for Engineer to schedule witnessing of testing, where elected by the Engineer.

### 1.5 OPERATING AND MAINTENANCE MANUALS

- A. Submit two copies of Operating and Maintenance Manuals to the Engineer for approval prior to the beginning of operator training. Provide four approved Operating and Maintenance Manuals for use in operator training. Manuals shall be bound in rigid cover, 3-ring binders with spine and cover labels and shall provide operating and maintenance information for every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and

## ELECTRICAL GENERAL PROVISIONS

reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied shall be clearly and legibly set forth in memoranda which shall, likewise, be bound with bulletins. As a minimum, the following information shall be provided as applicable:

1. Complete description of each system, item of equipment, and apparatus provided under this Division, including ratings, capacities, performances, data and curves, characteristics identifying name and number, locations, and wiring diagrams, including sources for all parts.
  2. Fully detailed parts lists, including all numbered parts and recommended spare parts, of each item of equipment and apparatus provided under this Division.
  3. Manufacturer's printed instructions describing operation, service, maintenance, and repair of each item of equipment and apparatus.
  4. Typewritten record of tests made of materials, equipment, and systems included under this Division. Such records shall state the dates the tests were conducted, name(s) of person(s) making and witnessing the tests, and citing any unusual conditions relevant to the tests.
  5. Identifying names, name tags designations and locations for all equipment.
  6. Fuse and motor heater information including location and use.
  7. Equipment and motor nameplate data.
  8. Copies of all approved Shop Drawing submittals.
  9. Fabrication drawings.
  10. Equipment and device bulletins and cut sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable.
  11. Maintenance instructions clearly highlighted to show all required periodic maintenance and lubrication.
  12. Wiring diagrams.
  13. Operating instructions clearly highlighted to show proper operating procedures for all equipment.
  14. Exploded parts views and parts list for all equipment and devices.
  15. Color-coding charts for all painted equipment and conduit.
  16. Location and listing of all spare parts and special keys and tools furnished to the Owner.
- B. Tools: Provide and deliver to the Owner's authorized representative any special tools required for maintenance of systems, equipment, and apparatus installed under this Division prior to requesting final acceptance of the installation.
- C. Commissioning requirements are part of this contract.

### 1.6 CODES, PERMITS AND FEES

- A. General:
1. Comply with the most recently revised versions of applicable laws, rules, regulations, and ordinances of federal, state, and local utilities and authorities. Where alterations to and deviations from the Contract Documents are required by said authority, report the requirements and secure approval before starting work. Obtain all applicable permits, licenses and inspections and pay all fees charged by above authorities.
- B. Code Design Basis:
1. The following codes and ordinances were used in the design of the project and shall be complied with during construction of the project.
    - a) Electrical Code – NEC, most recent edition enforced.
    - b) Energy Code – Commercial Building Energy Code.

C. Precedence:

1. Where Contract Document requirements are in excess of Code requirements and are permitted under the Code, the Contract Documents shall govern. None of the terms or provisions of the drawings or specification shall be construed as waiving any of the rules, regulations or requirements of these authorities. In the event of conflict between the Contract Documents and the local enforcing authority, the latter shall rule. Any modifications resulting there from shall be made without additional cost to the Owner or Engineer. This Contractor shall report any such modifications to the Engineer and secure his approval before proceeding.

**1.7 QUALITY ASSURANCE**

A. Materials/Methods:

1. Manufacturers, materials and methods described in the various sections of the Specifications, and indicated on the Drawings are intended to establish a standard of quality only. It is not the intention of the Engineer to discriminate against any product, material or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturers standard product would meet the requirements of the project design, Specifications and space constraints.

B. Alternative Products/Materials/Methods:

1. Products by other reliable manufacturers, other materials, and other methods may be accepted provided they have equivalent capacity, construction, and performance. Under no circumstances shall any substitution be made without the prior written approval of the Engineer.
2. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Engineer that the specified product, material or method is the only one that shall be used without prior approval.

C. Alternative Equipment:

1. Where substituted or alternative equipment is used on the project, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available, including all required Code and maintenance clearances, and to coordinate all equipment requirements and provisions with the Electrical Design and all other Contractors.

D. Compatibility:

1. Provide products that are compatible with other products of the electrical work, and with other work requiring interface with the electrical work, including electrical connections and control devices. For exposed electrical work, coordinate colors and finishes with other work. Determine in advance of purchase that equipment and materials proposed for installation will fit into the confines indicated, leaving adequate clearance as required by applicable codes and for adjustment, repair, and replacement.

**1.8 SITE VISIT AND FAMILIARIZATION**

A. General:

1. Become familiar with the Drawings and Specifications, examine the premises, and understand the conditions under which the Contract shall be performed, prior to submitting a bid.

B. Site:

## ELECTRICAL GENERAL PROVISIONS

1. Be informed of the site conditions, verify locations of new and existing equipment and determine exact requirements for connections.
- C. Coordination:
1. Submission of a bid for this project infers that the Electrical Contractor has visited the site and has become familiar with the Drawings and site conditions and has included in his proposal, all work necessary to properly install the systems on the project.
- D. Pre-Bid Conference:
1. Refer to Division 1.

### 1.9 DRAWINGS AND SPECIFICATIONS

- A. General:
1. The Drawings are schematic in nature and indicate approximate locations of the electrical systems, equipment, fixtures and devices, except where specific locations are noted and dimensioned on the Drawings. All items are shown approximately to scale. The intent is to show how these items shall be integrated into the project site. Locate all items by on the job measurements and in accordance with the Contract Documents. Cooperate with other trades to ensure project completion as indicated.
- B. Location:
1. Prior to locating electrical devices, light fixtures, and other items, obtain the Engineer's approval as to exact location. Locations shall not be determined by scaling Drawings. Mount lighting fixtures and electrical devices at the heights directed by the Engineer. Contractor shall be responsible for costs of redoing work of trades necessitated by failure to comply with this requirement.
  2. All electrical devices, lighting fixtures, and other devices shall be referenced to coordinated, established data points and shall be located to present symmetrical arrangements with these points and to facilitate the proper arrangements of acoustical tile panels and other similar panels with respect to the mechanical and electrical outlets and devices. Electrical devices, fixtures, and outlets shall be referenced to such features as wall and ceiling furring, balance, border widths, masonry joints, etc. Outlets in acoustical tile shall occur symmetrically in tile joints or in the centers of whole tiles and the exact location of each outlet and the arrangements to be followed shall be acceptable to the Engineer. Outlets in wall tile or masonry construction shall occur symmetrically in the centers of whole tiles, bricks, or blocks and the exact location of each outlet and the arrangement to be followed shall be acceptable to the Engineer.
  3. The Drawings show diagrammatically the location of the various outlets and apparatus. Exact locations of these outlets and apparatus shall be determined by reference to the general Drawings and to all detail Drawings, equipment Drawings, rough-in Drawings, etc., by measurements at the building, and in cooperation with the other trades. The Owner and Engineer reserve the right to make any reasonable change in location of any outlet or apparatus before installation, without additional cost to the Owner.
- C. Specifications:
1. The Specifications are intended to supplement the Drawings and it is not in the scope of the specifications to mention any part of the work that the Drawings are competent to fully explain. Conversely, any part of the work that the specification is competent to fully explain may not be mentioned on the Drawings.

### 1.10 DISCREPANCIES

- A. Clarification:

## ELECTRICAL GENERAL PROVISIONS

1. Clarification shall be obtained before submitting a proposal for the Work under this Division as to discrepancies or omissions from the Contract Documents or questions as to the intent thereof.
- B. Detailed Instructions:
1. Should it appear that the work hereby intended to be done or any of the materials relative thereto is not sufficiently detailed or explained in the Drawings or Specifications, then the Contractor shall apply to the Engineer for such further Drawings or explanations as may be necessary, allowing a 10 working day time period for the Engineer to respond.
- C. Interpretations:
1. Should any doubt or question arise respecting the true meaning of Drawings or Specifications, reference shall be made to the Engineer, whose written decision shall be final and conclusive.
- D. Contractor Agreement:
1. Consideration will not be granted for misunderstanding of the amount of work to be performed. Submission of a bid conveys full Contractor agreement of the items and conditions specified, shown, scheduled, or required by the nature of the project.

### 1.11 UTILITIES

- A. General:
1. Utility information shown on the Drawings has been shown based upon data obtained from the site survey and the agencies having jurisdiction and are accurate to the best of the knowledge of the Engineer.
- B. Coordination:
1. The Contractor shall be responsible for field verification of the actual location of site and/or building utilities and shall make modifications necessary for connection to or construction around those utilities at no additional cost to the Owner or Engineer.

### 1.12 TEMPORARY FACILITIES

- A. General:
1. Refer to Uniform General Conditions and Division 1 for requirements concerning temporary electrical facilities.
- B. Temporary power, connection and operation of Owner Furnished Equipment:
1. See Scope of Work description under Section 26 60 01.

### 1.13 SITE OBSERVATION

- A. General:
1. Observations at the site to verify general compliance with Contract Documents shall be made periodically by the Engineer or his representative. Written observation comments shall be submitted to the General Contractor for review and a written response.

### 1.14 COORDINATION OF ELECTRICAL WORK

- A. General:
1. Refer to Division 1 for general coordination requirements applicable to the entire work.
  2. It is recognized that the Contract Documents are diagrammatic in showing certain physical relationships that must be established within the electrical work and in its interface with other work, including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Contractor. The Drawings show diagrammatically the sizes and locations of the various conduit and raceway systems and

## ELECTRICAL GENERAL PROVISIONS

- equipment items along with the sizes of the major interconnecting distribution, without showing exact details as to elevations, offsets, control lines, and installation details.
3. Arrange electrical work in a neat, well organized manner with services running parallel with primary lines of the building construction and with a minimum of 7' overhead clearance where possible.
  4. The Contractor shall carefully lay out his work at the site to conform to the structural conditions, to avoid obstructions and to provide proper grading of lines. Exact locations of outlets, apparatus and connections thereto shall be determined by reference to detail Drawings, equipment Drawings, roughing-in Drawings, etc., by measurements at the building and in cooperation with other Contractors and, in all cases, shall be subject to the approval of the Engineer. Relocations necessitated by the conditions at the site or directed by the Engineer shall be made without any additional cost to the Owner or Engineer.
  5. All conduit and boxes except those in the various equipment rooms, in unfurnished spaces or where specifically designated herein or on the Drawings shall be run concealed in furring, plenums, and chases. Wherever conditions exist which would cause any of these items to be exposed in finished spaces, the Contractor whose work is involved shall immediately call the situation to the attention of the Engineer and shall stop work in those areas until the Owner's Representative or General Contractor directs the resumption of the work. Submit for approval a Shop Drawing for any change in equipment placement, etc.
  6. Equipment has been chosen to fit within the available space with all required Code and maintenance clearances and shall be installed as shown. Every effort has been made to also accommodate equipment of other approved manufacturers; however, since equipment and access space requirements vary, the final responsibility for installation access and proper fit of substituted equipment rests with the Contractor.
  7. System interferences shall be handled by giving precedence to pipe lines that require a stated grade for proper operation. Where space requirements conflict, the following order of precedence shall, in general, be observed:
    - a. Building Lines,
    - b. Structural members,
    - c. Soil and drain piping,
    - d. Utility water piping,
    - e. Electrical conduit.
  8. Locate electrical equipment properly to provide easy access. Arrange entire electrical work with adequate code access for operation and maintenance.
  9. Advise other trades of openings required in their work for the subsequent move in of large units of electrical work (equipment).
  10. Coordinate all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: Voltage, ampacity, capacity, electrical connections, space requirements, sequence of construction, building requirements and special conditions.
  11. When submitting Shop Drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

### 1.15 MATERIAL AND WORKMANSHIP

#### A. General:

## ELECTRICAL GENERAL PROVISIONS

1. Materials and equipment shall be new, of best grade and quality, and standard products of reputable manufacturers regularly engaged in the production of such materials and equipment.
- B. Workmanship:
  1. Work shall be executed and materials installed in accordance with the best practice of the trades in a thorough, substantial, workmanlike manner by competent workmen, presenting a neat appearance when completed.
- C. Manufacturer's Recommendations:
  1. With exceptions as specified or indicated on the Drawings or in the Specifications, apply, install, connect, erect, use, clean, and condition manufactured articles, materials, and equipment per manufacturer's current printed recommendations. Copies of such printed recommendations shall be kept at the job site and made available as required.

### 1.16 SPACE REQUIREMENTS

- A. General:
  1. Determine in advance of purchase that the equipment and materials proposed for installation will fit into the confines indicated, leaving adequate code clearances for adjustments, repair, or replacement.
- B. Clearance:
  1. Allow adequate space for clearance in accordance with requirements of the Code and local inspection department.
- C. Scheduled Equipment:
  1. The design shown on the Drawings is based on the equipment scheduled.
- D. Responsibility:
  1. Since space requirements and equipment arrangement vary for each manufacturer, the responsibility for initial access and proper fit rests with the Contractor.
- E. Review:
  1. Final arrangement of equipment to be installed shall be subject to the Engineer's review.

### 1.17 SAFETY REGULATIONS

- A. All electrical work shall be performed in compliance with all applicable and governing safety regulations. All safety lights, guards, signs, and other safety materials and provisions required for the performance of the electrical work shall be provided by and operated by the Electrical contractor.

### 1.18 DELIVERY, STORAGE AND HANDLING OF MATERIALS

- A. General:
  1. Protect all materials and equipment to be installed under this Division from physical and weather damage.
- B. Scope:
  1. Work under this Division shall include, but not limited to:
    - a) Shipping from point of manufacture to job site,
    - b) Unloading, moving, and storage on site with appropriate protection as required to properly protect equipment from rust, drip, humidity, dust, or physical damage,
    - c) Hoisting and scaffolding of materials and equipment included in this Division,
    - d) Ensuring safety of employees, materials, and equipment using such hoisting equipment and scaffolding as is required for safety.

C. Coordination:

1. All large pieces of apparatus which are to be installed in the building and which are too large to permit access through doorways, stairways or shafts shall be brought to the job by the Contractor and shall be placed in the spaces before enclosing partitions and structure are completed. All apparatus shall be cribbed up from the floor by Contractor and shall be covered with tarpaulins or other protective covering where required for protection.

**1.19 NOISE AND VIBRATION**

A. General:

1. One year warrants the electrical systems, and their component parts to operate without objectionable noise or vibration. Noise from systems or equipment that results in noise within occupied spaces above the recommended NC curves (refer to ASHRAE Standard) shall be considered objectionable. Vibration shall not be apparent to the senses in occupied areas of the building. Objectionable noise, vibration, or transmission thereof to the building shall be corrected.

**1.20 CLEANING, ADJUSTING, AND START-UP**

A. Clean up:

1. The Contractor shall clean away from the job site all debris, surplus material, and similar items, resulting from his work or operations, leaving the job and equipment in a clean condition. The Contractor shall thoroughly clean all pieces of equipment, conduit, boxes, fixtures, and similar items, leaving the installation in a first class condition.

B. Start-up Services:

1. Where specified for any individual item of electrical equipment, provide a factory-authorized representative for testing, start-up of equipment, and instruction of Owner's operating personnel. Certify that these services have been performed by including a properly executed invoice for these services, or a letter from the manufacturer.

C. Lubrication:

1. Provide means for lubricating all bearings and other machine parts. Extend a lubrication tube with suitable fitting to an accessible location and identify it where lubrication fittings are concealed or inaccessible. Lubricate all parts requiring lubrication and keep them adequately lubricated until final acceptance by the Owner.

D. Testing:

1. See Section 26 01 26 – Electrical Testing.

E. Operation Prior to Completion:

1. When any piece of electrical equipment is operable and it is to the advantage of the Contractor to operate the equipment, he may do so, providing that he properly supervises the operation, and has the Engineer's written permission to do so. The warranty period shall, however, not commence until such time as the equipment is operated for the beneficial use of the Owner, or date of substantial completion, whichever occurs first. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, properly adjust, and complete all deficiency list items before final acceptance by the Owner. The date of final acceptance and the start of the warranty may not be the same date.

**1.21 FINAL REVIEW**

A. General:

1. Upon completion of the Work, perform a final test of the entire system.

## ELECTRICAL GENERAL PROVISIONS

2. The system shall be operating properly and meet commissioning requirements.
3. After the final test, any changes or corrections noted as necessary for the Work to comply with these Specifications or the Drawings shall be accomplished without delay in order to secure final acceptance of the Work.
4. The date for the final test shall be sufficiently in advance of the Contract completion date to permit execution, before expiration of the Contract, of any adjustments or alterations that the final acceptance tests indicate as necessary for the proper functioning of all equipment. Any such modifications shall be completed within the time allotted for completion of the Contract. Retests shall be conducted as directed and shall be of such time duration as necessary to ensure proper functioning of adjusted and altered items. Retests shall not relieve the Contractor of completion date responsibility.
5. Certificates, including certificates of occupancy from local authorities and documents required herein, shall be completely in order and presented to the Engineer at least one week prior to the review.
6. Individuals knowledgeable of the systems and persons approved by the Engineer shall be present at this final inspection to demonstrate the system and prove the performance of the equipment.

### 1.22 OPERATION AND MAINTENANCE TRAINING (OWNER INSTRUCTION)

#### A. General:

1. The Contractor and appropriate factory-trained representatives shall instruct the Owner's representative in the proper operation and maintenance of all electrical and control systems and equipment, and shall explain all warranties.

#### B. Training Agenda Outline:

1. Prior to instruction of Owner Personnel, the Contractor shall prepare a typed outline, listing the subjects that will be included in this instruction, and shall submit the outline for review by the Engineer at least 2 weeks prior to the time of the training.

#### C. Training Requirements:

1. Training shall be provided per the specific requirements in other sections of these specifications. In addition to training required in other sections of the specifications, the Contractor shall conduct specifically organized training sessions in the overall operation and maintenance of the electrical and control system for personnel employed by the Owner. The training sessions shall be conducted to educate and train the personnel in operations and maintenance of all components of the electrical system outside the training requirements in the other Sections.
2. Training shall include, but not be limited to, the following:
  - a) Preventative maintenance procedures,
  - b) Trouble-shooting,
  - c) Calibration,
  - d) Testing,
  - e) Replacement of components,
  - f) Equipment operation.
3. At a minimum, one training session, at least 2 hours in duration, shall be conducted at the facility after start-up of the electrical and control systems. The Contractor shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least 2 weeks prior to the time of the training.

#### D. Certification:

1. At the conclusion of the instruction period, the Contractor shall obtain the signature of each person being instructed on each copy of the approved training outline to signify that

## **ELECTRICAL GENERAL PROVISIONS**

the personnel has a proper understanding of the operation and maintenance of the systems, and resubmit the signed outlines.

E. Other Requirements:

1. Refer to other Division 26 Sections for additional Operator Training requirements for specific pieces of equipment or specific systems.
2. The Contractor shall coordinate the Operator Training requirements listed above with the Owner Instruction requirements of Division 1.

### **1.23 CONTRACTOR WARRANTIES AND GUARANTEES**

A. General:

1. Contractor shall guarantee all material and equipment installed by him against defects in workmanship and material for a period of 12 months after final acceptance of the work by the Owner. He shall repair or replace any materials or equipment developing such defects within that time promptly on due notice given him by the Owner and at Contractor's sole cost and expense.

B. Equipment:

1. All equipment bearing a manufacturer's guarantee, such as electrical equipment, devices, components, and similar items, shall be construed to have an extended guarantee to the Owner by the manufacturer. Any such equipment that proves defective in materials or workmanship within the guarantee period is to be replaced by the Contractor in accordance with the manufacturer's guarantee.

## **PART 2 PRODUCTS**

### **2.1 NOT USED.**

## **PART 3 EXECUTION**

### **3.1 NOT USED.**

**END OF SECTION**

**SECTION 26 60 01**  
**ELECTRICAL SCOPE OF WORK**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Project Description
- B. Electrical Scope of Work

**1.2 DESCRIPTION OF WORK**

- A. The project includes the construction of a new wastewater lagoon and a transfer pumping system to pump lagoon effluent into the wastewater treatment plant via the existing wastewater treatment plant intake pump station and new flow control vault.
- B. Provide labor, materials, tools, machinery, equipment, fixtures, devices, and services necessary to complete the specified work of this and all other Divisions. Coordinate work with other trades to prevent conflicts without impeding job progress.
- C. Project work includes, but is not limited to:
  - 1. Installation of a new packaged lift station including, but not limited to:
    - a) Outdoor equipment rack,
    - b) Junction boxes,
    - c) Explosion proof junction boxes and raceway systems,
    - d) Ground rods,
    - e) Bonding,
    - f) Ground conductors,
    - g) Cable feeders,
    - h) Raceways,
    - i) Controls,
    - j) Floats,
    - k) Connections to motors and equipment,
    - l) All other components shown on the Drawings, specified, or required for a fully operational system.
  - 2. Electrical testing and certification as specified.
  - 3. Coordination with and connections to existing equipment and equipment furnished by the General Contractor or other Divisions.
  - 4. Additional items as shown on the Drawings or specified.

**1.3 RELATED SECTIONS**

- A. Section 26 00 00 – Electrical General Provisions
- B. Section 26 00 02 – Basic Materials and Methods
- C. Section 26 01 26 – Electrical Testing
- D. Section 26 05 19 – Wire and Cable
- E. Section 26 05 33 – Raceways
- F. Section 26 70 00 – Motors

- G. Section 26 90 25 – Control Components
- H. Section 33 32 13 – Packaged Wastewater Lift Station

**PART 2 PRODUCTS**

**2.1 GENERAL**

- A. Refer to specific Sections of the Specification for equipment.

**PART 3 EXECUTION**

**3.1 GENERAL**

- A. Installation shall be in accordance with the Specification section pertaining to the individual Equipment.

**END OF SECTION**

**SECTION 26 00 02**  
**BASIC MATERIALS AND METHODS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Basic requirements for electrical systems, including but not limited to:
  - 1. Manner of running conduits
  - 2. Hangers and supports
  - 3. Attachment
  - 4. Openings, cutting, and patching
  - 5. Excavation, trenching, and backfilling
  - 6. Flame spread properties of materials
  - 7. Cleaning and painting of electrical work
  - 8. Electrical system identification
  - 9. Warning signs and operational tags
  - 10. Prohibited markings
  - 11. Wiring device and equipment mounting heights

**1.2 DESCRIPTION OF WORK**

- A. This section covers the basic materials and methods of electrical construction as shown, scheduled, indicated, and specified.

**1.3 DEFINITIONS**

- A. For the purposes of providing materials and installing electrical work, the following definitions shall be used:
  - 1. Outdoor Area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
  - 2. Hazardous areas: Class I, II or III areas as defined in NFPA 70.
  - 3. Shop Fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

**1.4 RELATED SECTIONS**

- A. Related Sections include but are not necessarily limited to:
  - 1. Section 26 00 00 – Electrical General Provisions
  - 2. Section 26 05 33 – Raceways

**1.5 STANDARDS AND REFERENCES**

- A. American National Standards Institute (ANSI):
  - 1. C2, National Electrical Safety Code
  - 2. Z535.1, Safety Color Code
  - 3. Z535.2, Environmental and Facility Safety Signs
  - 4. Z535.3, Criteria for Safety Symbols

5. Z535.4, Product Safety Signs and Labels.
- B. National Fire Protection Association (NFPA):
  1. 70, National Electrical Code (NEC)
  2. 70E, Standard for Electrical Safety in the Workplace
  3. 79, Electrical Standard for Industrial Machinery
  4. 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities
- C. Occupational, Health and Safety Administration (OSHA):
  1. 1910.145, Specification for Accident Prevention Signs and Tags
- D. All materials and equipment specified herein shall within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

## **1.6 SUBMITTALS**

- A. Shop Drawings
  1. See Section 26 00 00.
  2. The Contractor shall submit to the Engineer, for review, a list of proposed manufacturers and product data on hangers, and supports.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. See Section 26 00 00.

## **PART 2 PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Refer to specific Division 26 sections and specific material paragraphs below.
- B. Provide all components of a similar type by one manufacturer.

### **2.2 ELECTRICAL EQUIPMENT SUPPORTS**

- A. Approved manufacturers:
  1. Unistrut Building Systems
  2. B-Line
  3. Globe Strut
- B. Material requirements:
  1. Galvanized steel: ASTM A123 or ASTM A153
  2. Stainless steel: AISI Type 316

### **2.3 NAMEPLATES**

- A. For labeling equipment enclosures and equipment that is visible with the enclosure door closed:
  1. Approved manufacturers catalog numbers:
    - a) W. H. Brady Co., #B-1.
    - b) Seton, "Setonply".
  2. Materials: Phenolic, 2-ply engraved.
  3. Size:

- a) Surface: As required for the text.
- b) Thickness: 1/16 IN.
- 4. Fabrication:
  - a) Two layer laminated.
  - b) Legend engraved through top lamination into bottom lamination.
  - c) Drilled holes in each corner, for screw mounting.
- 5. Colors: Black top surface, white core, unless otherwise indicated.
- 6. Fasteners: Self-tapping stainless steel screws.
- B. For labeling components inside equipment enclosures:
  - 1. Approved manufacturers catalog numbers:
    - a) W. H. Brady Co., "Industrial Strength Tape" #42018
    - b) Seton, "Component and General Identification Labels" #45553
    - c) Panduit, "Standard Labeling Tape" LS4-33
  - 2. Materials: vinyl tape or vinyl cloth with printable topcoat.
  - 3. Colors: White background, black printing.

## **2.4 WIRE MARKERS**

- A. For control panels, electrical gear, pull and junction boxes:
  - 1. Material: vinyl or polyester tape.
  - 2. Approved manufacturer's catalog numbers:
    - a) W. H. Brady Co., Indoor/Outdoor Vinyl Tape, B-580
    - b) Seton, "Self-Laminating Wire Marker Labels" M7340
    - c) Panduit, LS4M "Industrial Labeling Tape"
  - 3. Material: Heat shrinkable polyolefin.
  - 4. Approved manufacturer's catalog numbers:
    - a) Seton, Welded Wire Marking Sleeves
  - 5. Colors: White background, black printing.

## **2.5 SAFETY SIGNS**

- A. Approved manufacturers catalog numbers:
  - 1. W. H. Brady Co., #B-302 or #B-120
  - 2. Seton, Pressure Sensitive Vinyl or Tedlar Coated Plastic
  - 3. Panduit, GMM Polyester Film (Type PPS) or GMPE1 Rigid Polyethylene (Type PRS)
- B. Materials, size and fabrication:
  - 1. For outdoor use and on entrances to electrical rooms or stations: Fiberglass or coated plastic, surface area as required by the text, minimum area 7 x 10 IN, 60 mil thickness, drilled holes for screw mounting.
- C. Color in accordance with ASME (ANSI Z535.1, .2, .3 and .4) and OSHA 1910.145.
- D. Minimum letter size on indoor signs, 3/16 in.
- E. Maximize the letter size on outdoor signs to sufficiently fill the printable area on the sign.
- F. Standards: ASME/ANSI Z535.1, Z535.2, Z535.3 and Z535.4, OSHA 1910.145.

**PART 3 EXECUTION**

**3.1 MANNER OF RUNNING CONDUITS**

- A. Whenever possible, install horizontal conduit runs above water piping.
- B. Install all conduit to allow for adequate maintenance and access clearances to all equipment. The Contractor shall study all construction documents and carefully lay out all work in advance of fabrication and erection in order to meet the requirements of limited spaces. Where conflicts occur, the Contractor shall meet with all involved trades and the Construction Inspector and resolve the conflict prior to erection of any work in the area involved.
- D. Conduit and raceway connections, rough-in, and stub-up locations for equipment shall be coordinated by the Contractor to provide locations in locations indicated on approved manufacturers equipment shop drawings. Connection, rough-in and stub-up locations shown on the Drawings are diagrammatic for general reference only.

**3.2 HANGERS AND SUPPORTS**

- A. All supports required for the proper installation of equipment, wireway, and conduit shall be provided as hereinafter specified unless otherwise indicated on the Drawings.
- B. All conduits shall be supported as specified in Section 26 05 33, unless specifically noted differently on the Drawings or in the Specifications, but in every case shall be adequate to support the raceway being suspended. The supports shall be from the structure to line of grade, with proper provision for expansion, contraction, vibration elimination, and anchorage.
- C. Conduit shall not be supported from ductwork, piping, or equipment.
- D. Single conduits running horizontally shall be supported by Caddy, Minerallac, or approved equal; adjustable conduit hangers from adequately sized rods (minimum 1/8") from the building structure. Refer to Section 26 05 33 for additional requirements.
- E. Multiple conduits running horizontally shall be supported by trapeze channels suspended on rods or bolted to vertical building members. Channels shall be as manufactured by Unistrut, Superstrut, Kindorf, or approved equal. Conduits shall be secured to the channel with galvanized or stainless steel clamps. Refer to Section 26 05 33 for additional requirements.
- F. Vertical conduits, both concealed and exposed, shall be supported by clamping to vertical surfaces or by means of clamps resting on adjacent beams, or floor slabs, or both as required by the installation. Refer to Section 26 05 33 for additional requirements.
- G. Conduits and raceways run against building surfaces shall be supported by means recommended by the manufacturer, or by means of single or two-hole rigid conduit clamps. Two-hole clamps shall be provided where size of conduit and installation conditions warrant. Refer to Section 26 05 33 for additional requirements.
- H. All auxiliary steel required for conduit, cable tray, and wire-way supports, etc. shall be provided by the Electrical Trades unless specifically indicated to be provided by others. All support steel and fasteners shall be galvanized.
- I. Contractor shall review all Drawings, including Structural Drawings, for details regarding supports.
- J. All supports shall be of type and arrangement to prevent excessive deflection, to avoid excessive bending stresses between supports, and to eliminate transmission of vibration.
- K. Perforated strap shall not be used as a hanger material.

**3.3 ATTACHMENT**

- A. The load and spacing on each hanger and/or insert shall not exceed the safe allowable load for any component of the support system, including the concrete that holds the inserts. Reinforcement at inserts shall be provided as required to develop the strength required.
- B. All conduits not embedded in concrete or masonry shall be securely and independently supported so that no strain will be transmitted to outlet box and pull box supports, etc. Supports shall be rigid enough to prevent distortion of conduits during wire pulling.
- C. Inserts shall be of a type which will not interfere with reinforcing, and which will not displace excessive amounts of structural concrete. All methods of attachment to the structure and the use of after-set inserts shall be approved in writing by the Engineer.
- D. All conduit and equipment supports shall be designed and installed to avoid interference with other piping, hangers, ducts, conduit, supports, building structures, equipment, etc. All conduit, and wireway shall be installed with due regard to expansion and contraction and the type of hanger method of support, location of support, etc. shall be governed in part by this Specification.
- E. Fastening of conduits, etc., shall be as follows: To wood members - by wood screws; to masonry - by threaded metal inserts, metal expansion screws, or toggle bolts, whichever is appropriate for the particular type of masonry; to steel – machine – screws or welding (when specifically permitted or directed), or bolts, and to concrete by suitable inserts anchored to reinforcing steel, and poured in place unless other means are indicated on the plans. Power-actuated fasteners (shooting) will not be acceptable under any circumstances unless approved by the Engineer in writing.

**3.4 OPENINGS, CUTTING AND PATCHING**

- A. General:
  - 1. The Contractor shall be responsible for coordinating openings in the building construction for installation of electrical systems. Comply with the requirements of Division 1 for the cutting and patching of other work to accommodate the installation or electrical work. Except as individually authorized by the Engineer, cutting and patching of electrical work to accommodate the installation of other work is not permitted.
- B. Cut and Patch:
  - 1. Cut and patch walls, floors, etc., resulting from work in existing construction or by failure to provide proper openings or recesses in new construction.
- C. Methods of Cutting:
  - 1. Openings cut through concrete and masonry shall be made with masonry saws and/or core drills and at such locations acceptable to the Engineer. Impact-type equipment may be used upon written approval of the Engineer. Openings in pre-cast concrete slabs for conduits, outlet boxes, etc., shall be core drilled to exact size.
- D. Approval:
  - 1. If holes or sleeves are properly installed and cutting and patching becomes necessary, it shall be done at no change in Contract amount. Undertake no cutting or patching without first securing written approval from the Engineer. Patching shall create a surface which is structurally and aesthetically equal to the surface surrounding the area patched and shall be performed by the trade whose work is involved at no change in the Contract amount.
- E. Protection:
  - 1. Openings through exterior walls or roofs shall be provided with suitable covers while they are left open to protect the property or materials involved. Any openings through walls below grade shall be properly protected to prevent entrance of water or other damaging elements.

- F. Restoration:
  - 1. All openings shall be restored to "as-new" condition under the appropriate Specification Section for the materials involved, and shall match remaining surrounding materials and/or finishes. Restoration work shall be performed by the trades who originally installed the work being restored and shall be performed at no cost to the Owner or Engineer.
- G. Special Note:
  - 1. No coring, boring, or excavating which will weaken the structure shall be undertaken.

**3.5 EXCAVATING, TRENCHING AND BACKFILLING**

- A. General:
  - 1. The work hereunder includes whatever excavating and backfilling is necessary to install the electrical work. Coordinate the electrical work in the same area, including excavating and backfilling, dewatering, floor protection provisions, other temporary facilities needed for protection and proper performance of excavating and backfilling.
- B. Standards:
  - 1. Except as otherwise indicated, comply with the applicable provisions of Division 2 for electrical work excavating and backfilling. Refer instances of uncertain applicability to the Engineer for resolution before proceeding with the Work.
- C. The bottoms of trenches shall be excavated to required depths, slope and grade. The bottom of the trench shall be accurately excavated to provide firm, uniform bearing for the bottom of the raceways and duct-banks. Where mud or unstable soil is encountered in bottom of trench, it shall be removed to firm-bearing and the trench shall be back filled with bedding sand to proper grade and tamped to provide uniform firm support.
- D. The bottom of trenches shall be accurately graded to provide proper fall and uniform bearing and support for each section of the conduit on undisturbed soil or 2" of sand fill at every point along its entire length. In general, grading for electrical duct-banks and conduits shall be from building to manhole, and from a high point between manholes to each manhole.
- E. Exercise care not to excavate below required depth, leaving a flat bed of undisturbed earth; firm and secure before laying cable and duct-banks. In the event rock is encountered, excavate 6" below required depth and backfill to required depth with bedding sand, and compact to minimum 95% compaction.
- F. All grading in the vicinity of excavation shall be controlled to prevent surface ground water from flowing into the excavations. Any water accumulated in the excavations shall be removed by pumping or other acceptable method. During excavation, material suitable for backfilling shall be stacked in an orderly manner a sufficient distance back from edges of trenches to avoid overloading and prevent slides or cave-ins. Material unsuitable for backfilling shall be wasted and removed from the site and properly disposed of.
- G. The Contractor shall be fully responsible for the safety of persons, materials and equipment in or near trenches or other excavations and provide all required sloping, shoring, railings and other protective provisions.
- H. If any unknown and/or uncharted utilities are encountered during excavation, promptly notify Engineer and wait for his/her instruction before proceeding,
- I. If such unknown utilities are encountered and work is continued without contacting the Engineer for instructions, and damage is caused to said utilities, the Contractor shall repair at his own expense, such damage to the satisfaction of the owner or utility company concerned.
- J. Trenches shall not be backfilled until all required tests have been made by the Contractor and approved by the Engineer and any local authorities having jurisdiction.

- K. Backfill shall be compacted or cement stabilized sand up to 6" above the top of conduit. Backfill up to grade shall be in maximum 6" lifts with minimum 95% compaction of lifts. Refer to Division 2 or elsewhere in Contract Documents for additional trenching and backfill requirements.
- L. Opening and Reclosing Pavement, Landscape Areas and Lawns: Where excavation requires the opening of existing walks, street, drives, other existing pavement or lawns; such surfaces shall be cut as required to install new conduit and to make new connections to existing conduits. The sizes of the cut shall be held to a minimum, consistent with the work to be accomplished. After the installation of the new work is completed and the excavation has been backfilled and flooded, the area shall be patched or replaced, using materials to match those cut out or removed. Patches shall thoroughly bond with the original surfaces; these shall be level with them and shall meet all the requirements established by the authorities having jurisdiction over such areas. All removed work shall be replaced by craftsmen who regularly install the types of work being replaced.
- M. Excavation in Vicinity of Trees:
  - 1. All trees, including low hanging limbs within the immediate area of construction, shall be adequately protected to a height of at least 5' to prevent damage from the construction operations and/or equipment. All excavation within the outermost limb radius of all trees shall be accomplished with extreme care. All roots located within this outermost limb radius shall be brought to the attention of the Engineer before they are cut or damaged in any way. The Engineer will give immediate instructions for the disposition of same. All stumps and roots encountered in the excavation that are not within the outermost limb radius of existing trees shall be cut back to a distance of not less than 18" from the outside of any concrete structure or pipeline. No chips, parts of stumps, or loose rock shall be left in the excavation. Where stumps and roots have been cut out of the excavation, clean, compacted, dry bank sand shall be backfilled and tamped.

### **3.6 FLAMESPREAD PROPERTIES OF MATERIALS**

- A. Materials and adhesives incorporated in this project shall conform to NFPA Standard 255, "Method of Test of Surface Burning Characteristics of Building Materials". The classification shall not exceed a flame spread rating of 25 for all materials, adhesives, finishes, etc. specified for each system; and shall not exceed a smoke-developed rating of 50.

### **3.7 CLEANING AND PAINTING OF ELECTRICAL WORK**

- A. Prime, protective touch-up painting is included in the Work of this Division. Finish painting in equipment spaces, concealed locations, and other locations not exposed to the view of building occupants is included in the work of this Division. Finished painting in areas exposed to the view of building occupants is specified under Division 9.
- B. All equipment and materials furnished by the electrical subcontractor shall be delivered to the job with suitable factory finish.
- C. Electrical switchgear, disconnect switches, contactors, etc., with suitable factory-applied finishes shall not be repainted; except for aesthetic reasons where located in finished areas as directed by the Engineer and in a color selected by the Engineer. Where factory-applied finishes are damaged in transit, storage or installation; or before final acceptance, they shall be restored to factory-fresh condition by competent refinishers using the spray process.
- D. All equipment not finished at the factory shall be given a prime coat and then finish painted with two coats of enamel in color as directed by the Engineer. No nameplates on equipment shall be painted, and suitable protection shall be afforded such plates to prevent their being rendered illegible during the painting operations.
- E. The surfaces finish-painted shall first be prepared as follows:

## BASIC MATERIALS AND METHODS

1. Galvanized and black steel surfaces shall first be painted with one coat of galvanized metal primer.
  2. Aluminum surfaces shall first be painted with one coat of zinc chromate primer.
- F. All ferrous metal surfaces without protective finish and not galvanized, in exposed and concealed areas including chases, under floor and above ceilings, shall be painted with two coats of zinc chromate primer as the construction progresses to protect against deterioration.
- G. Before painting, all surfaces to be painted shall be suitably prepared. This shall include removing all oil, rust, scale, dirt, and other foreign material. Surfaces shall be made smooth by grinding, filing, brushing, or other approved method. In the painting operations, the primer for metal surfaces shall be of the zinc dust type unless specified otherwise, and where finish painting is specified, it shall be painted using materials and colors selected and approved by the Engineer. Refer to Division 9 for additional requirements.

### 3.8 WARNING SIGNS AND OPERATIONAL TAGS

- A. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.
- B. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical systems, provide tags of plasticized card stock, either preprinted or hand printed.

**END OF SECTION**

## **SECTION 26 01 26 ELECTRICAL TESTING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Material and installation requirements for:
  - 1. Testing of electrical systems.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide testing of electrical work installed under Division 26, as specified herein and in other Division 26 sections. Feeders and equipment shall not be placed in service until they have been checked and tested, as applicable.

#### **1.3 RELATED SECTIONS**

- A. Related Sections include but are not necessarily limited to:
  - 1. Section 26 00 00 – Electrical General Provisions
  - 2. Section 26 05 19 – Wire and Cable
  - 3. Section 26 05 26 – Grounding
  - 4. Section 26 70 00 – Motors

#### **1.4 STANDARDS AND REFERENCES**

- A. All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- B. All materials and equipment specified herein shall conform with all applicable NEMA, ANSI and IEEE Standards
- C. All materials and equipment specified herein and their installation methods shall conform to the latest published version of the National Electrical Code, NEC.

#### **1.5 SUBMITTALS**

- A. Shop Drawings
  - 1. See Section 26 00 00.
- B. Testing Procedures: Submit proposed testing procedures to the Engineer for review at least 10 working days prior to conducting any testing on the project.
- C. Reporting Forms: Submit proposed forms to be used in recording testing data and results to the Engineer for review at least 10 working days prior to conducting any testing on the project.
- D. Calibration List: Submit a listing of testing devices to be used for the project to the Engineer for approval. Listing shall include documentation that the devices are properly calibrated.
- E. Test Log: The Contractor shall maintain a test log at the site to document the results of all successful and unsuccessful testing as it is performed. This log shall be available for review by the Engineer and a copy of the log shall be submitted to the Engineer prior to the Substantial Completion inspection. A space shall be provided on the test log signoff by the Engineer or Owners representative.

- F. Test Data and Results: Submit complete data and certified test results for each test performed, including, but not limited to:
  - 1. Test performed,
  - 2. Test procedure,
  - 3. System and area tested,
  - 4. Date(s) and time(s) of test,
  - 5. Weather conditions,
  - 6. Test criteria,
  - 7. Test results,
  - 8. Additional pertinent information.
- G. Testing Certification: Certifications stating that submitted test data and results are true and correct shall be provided for all submittals under this section. Certification shall be executed by an authorized officer if the Contractor is a corporation, by a partner if the Contractor is a partnership, by the owner if the Contractor is a sole proprietorship or by the authorized representative if the Contractor is a joint venture.
- H. Operational Certification: For Packaged, Vendor Supplied, Custom Engineered, systems or equipment submit an operational certification which documents that all equipment and systems have been fully tested to verify proper operation in accordance with the design shown in the Contract documents and manufacturer's recommendations.

**1.6 NOTICE**

- A. Notify the Engineer in writing 10 working days prior to all scheduled testing to allow time for Engineer to schedule witnessing of testing, where elected by Engineer.

**PART 2 PRODUCTS**

**2.1 TESTING MATERIALS**

- A. General: Provide all materials and test equipment required for testing of specified electrical systems, including re-testing until acceptable results are obtained.
- B. Products: Tested products which fail to provide acceptable test results shall be repaired or replaced with suitable materials as required to obtain acceptable results.

**PART 3 EXECUTION**

**3.1 TESTING**

- A. General: Tests shall be made during the course of the construction as specified and as required by authorities having jurisdiction. Such test shall be conducted by this Division as part of the Work and shall include all personnel, material, and equipment required to perform test until satisfactory results are obtained. Any defects detected during testing shall be satisfactorily repaired or the equipment involved shall be replaced and the test re-executed.
- B. Testing shall include but not be limited to all items in other Sections of this Division and the following:
  - 1. Feeders: Refer to Section 26 05 19.
  - 2. Ground Rods: Refer to Section 26 05 26.
  - 3. Motors: Refer to Section 26 70 00.
  - 4. Pump Control Panel: Refer to Section 33 32 13.

- C. Test Reports (Attached)
  - 1. ELECTRICAL SYSTEM TEST REPORT - 600V CABLE
  - 2. ELECTRICAL GROUND ROD TEST REPORT
  - 3. MOTOR TEST REPORT

**END OF SECTION**

26 01 26 ELECTRICAL SYSTEM TEST REPORT - 600V CABLE

ELECTRICAL SYSTEM  
DESCRIPTION DATA

SERVICE DESCRIPTION:

nominal voltage, phase to phase  
phase to neutral - single or three phase-  
number of conductors

\_\_\_\_\_

SERVICE CONDUCTORS:

phase size and insulation type  
neutral size and insulation type  
ground size and insulation type

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SERVICE DISCONNECT DESCRIPTION:

circuit breaker or disconnect switch  
size (amps)  
fuse (amps)

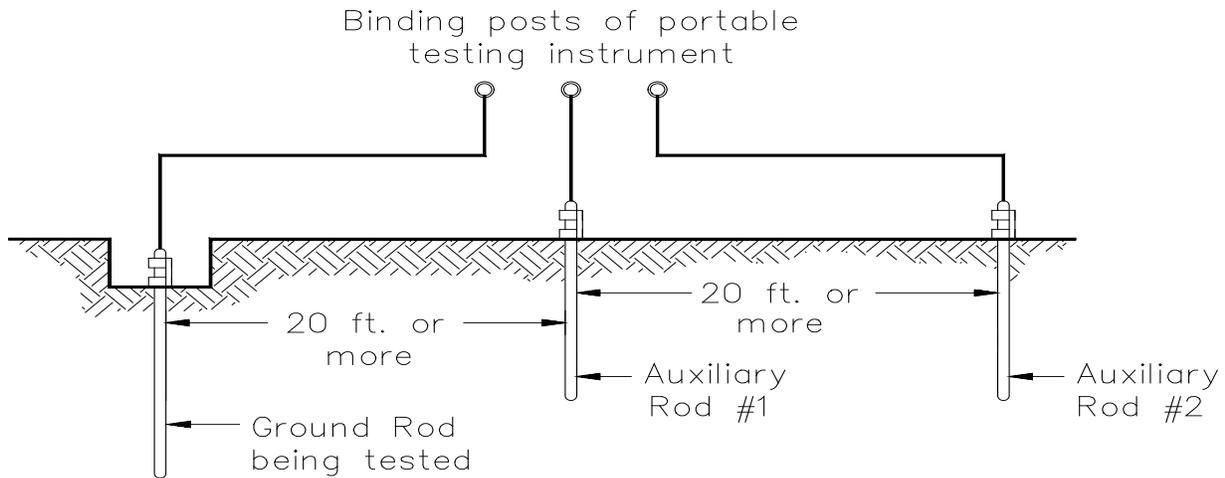
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\_\_\_\_\_

\_\_\_\_\_

MEASURED CONDITIONS		DATA
Operating Load Voltage	Volts	Vab_____Vbc_____Vca_____
		Van_____Vbn_____Vcn_____
Operating Load Feeder Current	Amps	Ia_____Ib_____Ic_____
Conductor Insulation Resistance - record the measurement for each set of conductors in a single raceway for the following circuits:	Megohms	a-b_____b-c_____c-a_____
	Megohms	a-g_____b-g_____c-g_____
1. Lift Pump Control Panel Feeder		

26 01 26 - ELECTRICAL GROUND ROD TEST REPORT



GROUND ROD RESISTANCE TESTING

PROCEDURE:

To measure ground resistance, two additional temporary grounds, consisting of short rods 2 or 3 feet long, shall be driven in the ground at least 20 feet away from the rod being tested. A direct-reading ground resistance tester shall then be connected to the three ground rods by means of insulated leads. The battery operated ground resistance tester reads the resistance of the ground rod being tested directly in ohms. The ground rod location / designation and its measured ohm value shall be recorded in chart below.

GROUND ROD LOCATION / DESIGNATION	OHM VALUE
1.	*
2.	*
3.	*
COMPOSITE GROUND	*

\*Ohm value of a single ground rod shall not exceed 25 Ohms. If additional ground rod(s) are added, the "composite" ground electrode shall have a maximum acceptable reading of 15 Ohms which shall be recorded in chart above.

26 01 26 - MOTOR DATA AND TEST REPORT

EQUIPMENT NAME AND NUMBER: Lift Pump #1

EQUIPMENT SPECIFICATION SECTION: \_\_\_\_\_

MOTOR STARTER LOCATION \_\_\_\_\_

CONTRACTORS REPRESENTATIVE \_\_\_\_\_ DATE \_\_\_\_\_

MOTOR NAMEPLATE DATA

MFR Name/Model No. \_\_\_\_\_  
Voltage/Phase/HP \_\_\_\_\_  
FLA/LRA \_\_\_\_\_  
Service Factor \_\_\_\_\_  
Efficiency Index (or percent) \_\_\_\_\_  
NEMA Design \_\_\_\_\_  
Code Letter \_\_\_\_\_  
Insulation Type \_\_\_\_\_  
Temperature Rise \_\_\_\_\_  
Ambient Temperature \_\_\_\_\_  
RPM \_\_\_\_\_  
Enclosure \_\_\_\_\_  
Thermal Trip Setting \_\_\_\_\_  
Space HTR: Watts/Volts \_\_\_\_\_  
Other Data \_\_\_\_\_

MOTOR STARTER INFORMATION

Manufacturer/Type \_\_\_\_\_  
Overload Heater No \_\_\_\_\_

* <u>RECORDED FULL LOAD DATA</u>	VOLTS	A-G _____	B-G _____	C-G _____
FULL LOAD OPERATING VOLTAGE	VOLTS	A-B _____	B-C _____	C-A _____
FULL LOAD OPERATING CURRENT	AMPS	A _____	B _____	C _____

INSULATION RESISTANCE (deenergized)	MEGOHMS	A-G _____	B-G _____	C-G _____
--	---------	-----------	-----------	-----------

MOTOR CIRCUIT RESISTANCE	OHMS	A-B _____	B-C _____	C-A _____
--------------------------	------	-----------	-----------	-----------

\*VOLTAGE & CURRENT READINGS SHALL BE TAKEN AT THE CLOSEST ACCESSIBLE POINT TO THE LOAD

26 01 26 - MOTOR DATA AND TEST REPORT

EQUIPMENT NAME AND NUMBER: Lift Pump #2

EQUIPMENT SPECIFICATION SECTION: \_\_\_\_\_

MOTOR STARTER LOCATION \_\_\_\_\_

CONTRACTORS REPRESENTATIVE \_\_\_\_\_ DATE \_\_\_\_\_

MOTOR NAMEPLATE DATA

MFR Name/Model No. \_\_\_\_\_  
Voltage/Phase/HP \_\_\_\_\_  
FLA/LRA \_\_\_\_\_  
Service Factor \_\_\_\_\_  
Efficiency Index (or percent) \_\_\_\_\_  
NEMA Design \_\_\_\_\_  
Code Letter \_\_\_\_\_  
Insulation Type \_\_\_\_\_  
Temperature Rise \_\_\_\_\_  
Ambient Temperature \_\_\_\_\_  
RPM \_\_\_\_\_  
Enclosure \_\_\_\_\_  
Thermal Trip Setting \_\_\_\_\_  
Space HTR: Watts/Volts \_\_\_\_\_  
Other Data \_\_\_\_\_

MOTOR STARTER INFORMATION

Manufacturer/Type \_\_\_\_\_  
Overload Heater No \_\_\_\_\_

* <u>RECORDED FULL LOAD DATA</u>	VOLTS	A-G _____	B-G _____	C-G _____
FULL LOAD OPERATING VOLTAGE	VOLTS	A-B _____	B-C _____	C-A _____
FULL LOAD OPERATING CURRENT	AMPS	A _____	B _____	C _____

INSULATION RESISTANCE (deenergized)	MEGOHMS	A-G _____	B-G _____	C-G _____
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MOTOR CIRCUIT RESISTANCE	OHMS	A-B _____	B-C _____	C-A _____
--------------------------	------	-----------	-----------	-----------

\*VOLTAGE & CURRENT READINGS SHALL BE TAKEN AT THE CLOSEST ACCESSIBLE POINT TO THE LOAD

## **SECTION 26 05 19 WIRE AND CABLE**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Material and installation requirements for:
  - 1. Power and control cable
  - 2. Instrumentation and data cable
  - 3. Wire connectors
  - 4. Insulating tape
  - 5. Pulling lubricant

#### **1.2 DESCRIPTION OF WORK**

- A. Provide electrical wiring and connections as shown, scheduled, indicated, and specified.
- B. All wiring shall be in raceways.

#### **1.3 RELATED SECTIONS**

- A. Related Sections include but are not necessarily limited to:
  - 1. Section 26 00 00 – Electrical General Provisions
  - 2. Section 26 00 02 – Basic Materials and Methods
  - 3. Section 26 01 26 – Electrical Testing
  - 4. Section 26 05 26 – Grounding
  - 5. Section 26 05 33 – Raceways

#### **1.4 STANDARDS AND REFERENCES**

- A. All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- B. Products shall be designed, manufactured, tested, and installed in compliance with the following standards:
  - 1. Insulated Cable Engineers Association:
    - a) S-58-679, Control Cable Conductor Identification
  - 2. Institute of Electrical and Electronic Engineers (IEEE):
    - a) 518, Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources
  - 3. National Electrical Manufacturers Association (NEMA):
    - a) ICS 4, Terminal Blocks for Industrial Use
  - 4. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
    - a) WC 70/ICEA S-95-658, Standard for Nonshielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy
  - 5. National Fire Protection Association (NFPA):
    - a) 70, National Electrical Code (NEC)

- b) 262, Method of Test for Fire and Smoke Characteristics of Wires and Cables.
- 6. Underwriters Laboratories, Inc. (UL):
  - a) 44, Thermoset-Insulated Wires and Cables
  - b) 83, Thermoplastic-Insulated Wires and Cables
  - c) 467, Grounding and Bonding Equipment
  - d) 486A, Wire Connectors and Soldering Lugs for use with Copper Conductors
  - e) 486C, Splicing Wire Connectors
  - f) 510, Insulating Tape
  - g) 1581, Reference Standard for Electrical Wires, Cables, and Flexible Cords
- C. All materials and equipment specified herein and their installation methods shall conform to the latest published version of the National Electrical Code, NEC.

## 1.5 DEFINITIONS

- A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- B. Instrumentation Cable: Multiple conductor, insulated, twisted or untwisted, with outer sheath. The following are specific types of instrumentation cables:
  - 1. Analog signal cable: Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 V DC) signals, using No. 16 AWG and smaller conductors. Commonly used types are defined in the following:
    - a) UTP: Unshielded twisted pair,
    - b) TSP: Twisted shielded pair, (or STP: Shielded twisted pair),
    - c) TST: Twisted shielded triad.
  - 2. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.
- C. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, AWG No. 8 and larger.
- D. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, AWG No. 16, AWG No. 14, AWG No. 12 or AWG No. 10.

## 1.6 SUBMITTALS

- A. Shop Drawings
  - 1. See Section 26 60 00.

## PART 2 PRODUCTS

### 2.1 CONDUCTORS

- A. Conductors shall be stranded copper. Sizes AWG No. 14, 12 and 10 for general purpose lighting and receptacle wiring and all wiring within circuit breaker panels may be solid. All other conductors shall be stranded. Insulation shall be THW-2, THWN-2, or THHN, (90°F) chosen to satisfy environmental conditions. Conductors used for power circuits shall not be smaller than AWG No. 12. Control conductors may be AWG No. 14.

### 2.2 CONNECTORS

- A. Ideal Industries "Wing Nut" or 3M Company "SCOTCHLOCK" pre-insulated connectors may be used for lighting and receptacle circuits for splices and taps in conductors AWG No. 10

and smaller. For AWG No. 8 and larger conductors, utilize Thomas & Betts compression connectors. Compress using recommended die and tools.

- B. For connections of wire to cord to removable equipment provided with integral cords (such as floats, transducers, etc.) provide junction box with terminals and coat with liquid insulation.
- C. For connections of wire to cord for submersible motors of all size wire use a water proof motor stub insulator: Thomas & Betts multi splice insulator MSLT112-4 or equal.

### **2.3 SPLICE INSULATION**

- A. Splice insulation shall be equal to the conductor utilized.
- B. Insulate all permanent splices that are underground or in damp or corrosive environments with cast epoxy type insulation which covers the jacket of all cords and the insulation on all wire. Epoxy splice shall be Scotch #3570 or equal.

### **2.4 SHIELDED SIGNAL CABLE**

- A. Signal conductor cable shall be AWG No. 16 individually twisted, shielded pairs, BELDEN #8719, or equal. Conductors shall be tinned copper with color coded 90° C PVC insulation and individual conductor jacket of nylon. Shielding shall be aluminum polyester 100% shield coverage with drain wire. The cable shall have an overall PVC jacket. The insulation system shall be rated for 300V.
- B. For applications where 600V insulation is required, 600V insulated signal wire shall only be used where required by Code. BELDEN 1120A or equal.

### **2.5 MOTOR TERMINAL SPLICE INSULATION**

- A. Provide motor terminal splice insulation in the motor connection box that will withstand constant vibration and abrasion without degrading the insulation of the splice. A product shall be used that is specifically designed for the purpose of motor terminations.
  - 1. For motors in outdoor, damp, or corrosive environments, use a water proof motor stub insulator, Thomas & Betts multi splice insulator MSLT112-4 or equal. For splices using wire larger than AWG No. 8 it is also acceptable to use a heat shrinkable motor connection stub splices, RAYCHEM, MCK-V series or equal.

## **PART 3 EXECUTION**

### **3.1 GENERAL**

- A. Splicing of power and control and signal wires or cables is not allowed. All wire transitions shall be done on terminals.
- B. Keep all conductors within the allowable tension limits during installation. Lubricants for wire pulling, if used, shall be approved for the insulation and raceway material. Observe cable manufacturer's and industry standard cable bending radius recommendations.
- C. Incoming conductors in panelboards, control panels, motor control centers, etc., AWG No. 6 and smaller, shall be bundled and laced at intervals not greater than 6 inches and neatly spread into trees and connected to their respective terminals.
- D. Sufficient slack shall be allowed in conductors for alterations in terminal connections. Lacing shall be done with plastic cable ties using a tensioning tool designed for that purpose.
- E. Conductors crossing hinges shall be made up into groups not exceeding twelve and shall be so arranged that they will be protected from chafing when the hinged member is moved.

- F. Conductors installed in handholes shall be bundled and neatly racked to the side of the handhole. All splices (if allowed) shall be a minimum of 6 inches above the bottom of the handhole.

**3.2 WIRE AND CABLE TERMINATION**

- A. Power conductors, AWG No. 8 and larger may be terminated directly in box-type lugs.
- B. Solid conductors (when allowed for lighting and receptacle circuits) of AWG No. 10 and AWG No. 12 may be directly terminated to screw terminals.
- C. For any power, control, or signal wire terminating on screw type terminals; provide spade or ring tongue type terminations.
- D. Stranded control conductors may be directly terminated in box type terminals at control panels. Insulated terminals shall be used also on all stranded instrumentation wiring.
- E. Special instrumentation cables shall be terminated in accordance with the recommendations of the manufacturer of the equipment and subject to review by the Engineer.
- F. No splices shall be used in power, control and/or signal wiring. The wiring shall be continuous from point-to-point.
- G. Terminals and connectors shall be installed with the compression tool recommended by the terminal manufacturer. Solid wire shall not be lugged, but shall be terminated with a full ring eye of the wire under the binding-head screw or saddle of the terminal block. Electrical spring connectors may be used only on lighting circuits.

**3.3 COLOR CODING**

- A. Wiring shall conform to the following color code.
- B. Insulation on phase conductor sizes AWG No. 10 and smaller shall be colored, No.8 AWG and larger may have black insulation with plastic tape of the appropriate color from the table below.
- C. Insulation on the grounded conductor (neutral) sizes AWG No. 8 and smaller shall be colored, AWG No. 6 and larger may have black insulation with plastic tape of white or gray in accordance with the table below.

<b>Description</b>	<b>120/208/240V</b>	<b>277/480V</b>	<b>Control</b>
Phase A (Left)	Black	Brown	--
Phase B (Center)	Red	Orange	--
Phase C (Right)	Blue	Yellow	--
Neutral	White	Gray	White
Ground	Green	Green	Green
120 VAC Control	--	--	Red
120 VAC Control	Neutral	--	White
DC Control (+)	--	--	Blue
DC Control (-)	--	--	Gray
External Source	--	--	Yellow

- D. All control wiring in control panels or other enclosures that is powered from an external source and is not disconnected by the control panel disconnect shall be terminated at a



## **SECTION 26 05 26 GROUNDING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Material and installation requirements for:
  - 1. Grounding

#### **1.2 DESCRIPTION OF WORK**

- A. This section covers furnishing and installing all grounding and/or bonding conductors, connectors, ground rods and terminations as required to meet these specifications and to comply with Article 250 of the National Electric Code.

#### **1.3 RELATED SECTIONS**

- A. Related Sections include but are not necessarily limited to:
  - 1. Section 26 00 00 – Electrical General Provisions
  - 2. Section 26 01 26 – Electrical Testing
  - 3. Section 26 05 19 – Wire and Cable
  - 4. Section 26 05 33 – Raceways

#### **1.4 STANDARDS AND REFERENCES**

- A. All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- B. Products shall be designed, manufactured, tested, and installed in compliance with the following standards:
  - 1. American National Standards Institute:
    - a) ANSI/IEEE Standard 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems.
  - 2. American Society for Testing and Materials (ASTM):
    - a) B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
  - 3. National Fire Protection Association (NFPA):
    - a) 70, National Electrical Code (NEC).
  - 4. Underwriters Laboratories, Inc. (UL):
    - a) 467, Electrical Grounding and Bonding Equipment.
- C. All materials and equipment specified herein and their installation methods shall conform to the latest published version of the National Electrical Code, NEC.

#### **1.5 SUBMITTALS**

- A. Shop Drawings
  - 1. See Section 26 00 00.
  - 2. See Section 26 01 26.
    - a) After installation is complete:

- Ground rod and system test results

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. See Section 26 00 00.

**PART 2 PRODUCTS**

**2.1 GENERAL**

- A. For each electrical grounding connection, provide a complete assembly of materials to construct a completely grounded electrical system.
- B. Raceways for grounding conductors shall be as specified in Section 26 05 19.
- C. Grounding cable, wire and connectors shall be as specified in Section 26 05 33.
- D. Grounding conductors and jumpers shall be connected to each other and to items to be grounded by means of approved type pressure connectors, clamps, and other suitable methods approved by the Engineer. No solder connections shall be made.

**2.2 GROUNDING ELECTRODE CONDUCTORS**

- A. All concrete encased or direct buried underground grounding electrode conductors shall be soft drawn stranded bare copper cable, conforming to ASTM B8.
1. Sized as required by Table 250-66 of the NEC, except where a larger size conductor is shown on the Contract Drawings.
- B. Equipment grounding conductor:
1. Green copper conductor: Identical insulation to phase conductors.
  2. Sized as required by Table 250-122 of the NEC, except where a larger size conductor is shown on the Contract Drawings.

**2.3 GROUND ROD BOXES**

- A. Provide ground rod boxes for each ground rod. Ground rod boxes shall be concrete with traffic rate covers, Fogtite SP-1, or approved equal.

**2.4 GROUNDING ELECTRODE RODS**

- A. Grounding electrode rods used shall be a minimum of 3/4" diameter by 10' long, steel core and thick copper jacket (copperclad).
- B. Heavy uniform coating of electrolytic copper molecularly bonded to a rigid steel core. Corrosion resistant bond between the copper and steel. Hard drawn for a scar-resistant surface. UL listed.
1. Blackburn
  2. Thomas & Betts

**2.5 GROUND CLAMPS**

- A. Ground clamps for connecting grounding conductors to copper, brass, or lead pipes shall be made of copper. If pipes are of steel or iron, the ground clamps should be made of galvanized iron. These clamps shall be designed to provide permanent and positive pressure and to avoid mechanical injury to the pipe.
- B. High copper alloy content, compression type, noncorrosive.
- C. UL 467 listed.

1. Burndy
2. ILSCO
3. Thomas & Betts

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Remove paint, rust, or other nonconducting material from contact surfaces before making ground connections.
- C. Grounding System
  1. Locate ground rods at approximate locations shown on Drawings.
  2. Install rods in firm soil outside of excavated areas.
  4. Drive top of rod to minimum depth of 6 IN below finished grade unless otherwise noted on Contract Drawings.
  5. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
  6. Interconnect all ground rods with grounding electrode conductor:
  7. Size per the NEC unless a larger size is shown on the Drawings.
  8. Do not splice grounding electrode conductor.
  9. Provide excavation required for installation of ground conductors buried in earth.
  10. Allow sufficient slack to prevent conductor breakage during backfill or due to ground movement.
  11. Leave taps, junctions, and splices uncovered until inspected by Engineer.
  12. Backfill around grounding system completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.
  13. Bond underground metal piping to the grounding system in accordance with NEC 250. Grounding clamps may be utilized on piping if exothermic welds may damage structural integrity.
  14. All underground connections shall be exothermically welded.
- D. Complete system resistance:
  1. 15 Ohms or less.

**3.2 RACEWAY GROUNDING - CONDUIT**

- A. All metallic conduit shall be electrically continuous.
- B. Provide grounding-type insulating bushings:
  1. For all equipment not supplied with a conduit hub.
- C. Bond all conduit, at entrance and exit of equipment, to equipment ground bus or ground lug.
- D. Use manufactured conduit hubs at all panels.
- E. Provide bonding jumpers if conduit are installed in concentric knockouts.
- F. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.

- G. Provide bonding jumper from equipment ground lug to RGS conduit if flexible conduit is utilized for equipment connections.
- H. Provide bonding jumpers identical in conductor size to the largest ground conductor run within the conduit.

**3.3 EQUIPMENT GROUNDING**

- A. Ground all voltage levels at the supply transformer from the secondary neutral to the grounding system.
- B. Provide a grounded conductor between the supply transformer and the grounding buses of all supplied equipment.
- C. Ground all equipment supplied from distribution equipment through the distribution equipment ground bus. Provide an equipment grounding conductor connected to the ground bus and equipment ground lug.
- D. Provide a minimum of two separate grounding electrode conductors for bonding all primary distribution equipment ground buses to the grounding system.
- E. Bond equipment fed from other equipment to that equipment.
- F. Consider control devices (switches, indicating lights, meters, starters, relays, etc.) mounted in MCC's, switchgear, control panels, or other metal enclosures to be adequately grounded, if the enclosure ground lug or ground bus is properly grounded.
- G. Do not splice grounding conductors.
- H. Run all equipment grounding conductors in conduit.
- I. Provide separate grounding conductors bonded to the grounding system for all DC equipment.
- J. Ground unused and spare power and control cable at both ends.
- K. Size all grounding conductors in accordance with Article of the NEC unless larger size is shown on the Drawings.

**3.4 TESTING**

- A. Ground Resistance Test:
  - 1. See Section 26 01 26.

**END OF SECTION**

## **SECTION 26 05 33 RACEWAYS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Material and installation requirements for:
  - 1. Conduits
  - 2. Conduit fittings
  - 3. Conduit supports
  - 4. Pull and junction boxes

#### **1.2 DESCRIPTION OF WORK**

- A. Provide electrical raceway and fitting work as shown, scheduled, indicated, and specified.
- B. All electrical conductors shall be installed in conduit or surface metallic raceways. Conduit shall be as specified herein.
- C. The types of electrical raceways and fittings required for the project include, but are not limited to, the following.
  - 1. Rigid metallic conduit (RMC) and intermediate metal conduit (IMC)
  - 2. Rigid nonmetallic conduit

#### **1.3 RELATED SECTIONS**

- A. Related Sections include but are not necessarily limited to:
  - 1. Section 26 00 00 – Electrical General Provisions
  - 2. Section 26 00 02 – Basic Materials and Methods
  - 3. Section 26 05 19 – Wire and Cable
  - 4. Section 26 05 26 – Grounding

#### **1.4 STANDARDS AND REFERENCES**

- A. All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- B. Products and installation shall comply with applicable sections of the following standards:
  - 1. American Iron and Steel Institute (AISI)
  - 2. American National Standards Institute (ANSI):
    - a) C80.1, Rigid Steel Conduit - Zinc-Coated
    - b) C80.6, Intermediate Metal Conduit - Zinc-Coated
  - 3. ASTM International (ASTM):
    - a) A123, Standard Specification for. Zinc Coating (Hot-Dip Galvanized) Coatings on Iron and Steel Products
    - b) A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
    - c) D1784, Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds
    - d) D2564, Solvent Cements for PVC Plastic Pipe, Tubing, and Fittings

- e) E84, Standard Test Method for Surface Burning Characteristics of Building Materials
- f) F512, Standard Specification for Smooth-Wall PVC Conduit and Fittings for Underground Installation
- 4. National Electrical Manufacturers Association (NEMA):
  - a) FB 1, Fittings and Supports for Conduit and Cable Assemblies
  - b) TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing
  - c) 250, Enclosures for Electrical Equipment (1000 Volts Maximum)
- 5. Underwriters Laboratories, Inc. (UL):
  - a) 6, Rigid Metal Conduit
  - b) 50, Standard for Safety Enclosures for Electrical Equipment
  - c) 467, Grounding and Bonding Equipment
  - d) 514A, Standard for Safety Metallic Outlet Boxes
  - e) 514B, Fittings for Cable and Conduit
  - f) 651, Schedule 40 and 80 Rigid PVC Conduit
  - g) 886, Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations
  - h) 1242, Intermediate Metal Conduit
- C. All materials and equipment specified herein and their installation methods shall conform to the latest published version of the National Electrical Code, NEC.

## **1.5 SUBMITTALS**

- A. Shop Drawings
  - 1. See Section 26 00 00.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. See Section 26 00 00.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. Provide metal conduit, tubing, and fittings of the type, grade, size, and weight (wall thickness) as shown and required for each service. Where type and grade are not indicated, provide proper selection determined by this Section to fulfill the wiring requirements and complying with the NEC for electrical raceways.
- B. For each electrical raceway system indicated, provide a complete assembly of conduit, tubing, or duct with fittings, including, but not necessarily limited to, connectors, nipples, couplings, expansion fittings, bushings, locknuts, other components and accessories as needed to form a complete system of the type indicated.
- C. Conduit fittings shall be designed and approved for the specific use intended. Conduit fittings, including flexible, shall have insulated throats or bushings. Rigid conduits shall have insulated bushings, except insulated throat grounding bushings shall be used on all conduits without ground conductors and where required by N.E.C. Article 250.

### **2.2 ACCEPTABLE MANUFACTURERS**

- A. Provide products complying with these specifications and produced by one of the following:
  - 1. Rigid metallic conduits:
    - a) Allied Tube and Conduit Corporation
    - b) Triangle PWC Inc.

- c) Western Tube and Conduit Corporation
- d) Wheatland Tube Company
- e) LTV Steel Company
- 2. Rigid Nonmetallic Conduit:
  - a) Carlon
  - b) Cantex
  - c) Triangle PWC, Inc.
- 3. Raceway Fittings:
  - a) Appleton Electric Company
  - b) Cantex (PVC)
  - c) Carlon (PVC)
  - d) Crouse Hinds
  - e) Efcor Division
  - f) ETP-Uni-Couple
  - g) O.Z. Gedney Company
  - h) Racor, Inc.
  - i) Republic Steel Corporation
  - j) Steel City
  - k) Thomas and Betts
- 4. Support systems:
  - a) Unistrut Building Systems
  - b) B-Line Systems Inc.
  - c) Kindorf
  - d) Minerallac Fastening Systems
  - e) Caddy
- 5. Outlet, pull and junction boxes:
  - a) Appleton Electric Co.
  - b) Crouse-Hinds
  - c) Killark
  - d) O-Z/Gedney
  - e) Steel City
  - f) Racor
  - g) Bell
  - h) Hoffman Engineering Co.
  - i) Wiegmann
  - j) B-Line Circle AW
  - k) Adalet

### 2.3 RIGID METALLIC CONDUITS

- A. Rigid Galvanized Steel Conduit (RGS):
  - 1. Mild steel with continuous welded seam,
  - 2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing; threads galvanized after cutting,
  - 3. Internal Coating: Baked lacquer, varnish or enamel for a smooth surface.
  - 4. Standards: ANSI C80.1, UL 6.
- B. Intermediate Metal Conduit (IMC):
  - 1. Mild steel with continuous welded seam,

2. Metallic Zinc Applied by Hot-Dip Galvanizing or Electro-Galvanizing; threads galvanized after cutting,
3. Internal Coating: Baked lacquer, varnish or enamel for a smooth surface.
4. Standards: ANSI C80.6, UL 1242.

## 2.4 RIGID NON-METALLIC CONDUIT

- A. Schedules 40 (PVC-40) and 80 (PVC-80):
  1. Polyvinyl-chloride (PVC) plastic compound which meets, as a minimum, ASTM D1784 cell classification PVC 12233-A, B, or C,
  2. Rated for direct sunlight exposure,
  3. Fire retardant and low smoke emission,
  4. Shall be suitable for use with 90 Deg C wire and shall be marked "maximum 90 Deg C".
  5. Standards: ASTM D1784, NEMA TC 2, UL 651.

## 2.5 CONDUIT FITTINGS AND ACCESSORIES

- A. Fittings for Use with RGS and IMC:
  1. In hazardous locations:
    - a) Listed for use in Class I, Groups C and D locations.
  2. Locknuts:
    - a) Threaded steel or malleable iron,
    - b) Gasketed or non-gasketed,
    - c) Grounding or non-grounding type.
  3. Bushings:
    - a) Threaded, insulated metallic,
    - b) Grounding or non-grounding type.
  4. Hubs: Threaded, insulated and gasketed, metallic, for rain-tight connection.
  5. Couplings:
    - a) Threaded, straight-type: Same material and finish as the conduit with which they are used on.
    - b) Threadless type: Gland compression or self-threading type, concrete tight.
  6. Unions:
    - a) Threaded galvanized steel or zinc plated malleable iron.
  7. Conduit bodies:
    - a) Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs,
    - b) Standard and mogul size.
    - c) Cover: Clip-on type with stainless steel screws. Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
  8. Sealing fittings:
    - a) Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs,
    - b) Standard and mogul size, with or without drain and breather.
    - c) Fiber and sealing compound: UL listed for use with the sealing fitting.
  9. Hazardous location flexible coupling:
    - a) Bronze braided covering over flexible brass tubing,
    - b) Liquid tight and arc resistant,
    - c) Bronze end fittings and zinc-plated steel or malleable iron unions and nipples.
  10. Expansion couplings:
    - a) 2 IN nominal straight-line conduit movement in either direction,

- b) Galvanized steel with insulated bushing,
  - c) Gasketed for wet locations,
  - d) Internally or externally grounded.
- B. Fittings for Use with Rigid Non-Metallic Conduit:
- 1. Coupling and adapters shall be of the same material, thickness, and construction as the conduits with which they are used.
    - a) Standards: UL 651, NEMA TC 3.
  - 2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
    - a) Standards: ASTM D2564.
- C. Weather and Corrosion Protection Tape:
- 1. PVC based tape, 10 mils thick,
  - 2. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct burial,
  - 3. Used with appropriate pipe primer.

## 2.6 OUTLET BOXES

- A. Cast Outlet Boxes:
- 1. Zinc plated cast iron or die-cast copper free aluminum with manufacturer's standard finish,
  - 2. Threaded hubs and grounding screw,
  - 3. Styles:
    - a) "FS" or "FD",
    - b) "Bell",
    - c) "EDS" or "EFS" for hazardous locations.
  - 4. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.
  - 5. Standards: UL 514A and 886.

## 2.7 PULL AND JUNCTION BOXES

- A. NEMA 4X Rated (metallic):
- 1. Body and cover: 14 GA Type 316 stainless steel,
  - 2. Seams continuously welded and ground smooth,
  - 3. No knockouts,
  - 4. External mounting flanges,
  - 5. Hinged door and stainless steel screws and clamps,
  - 6. Door with oil-resistant gasket.

## 2.8 SUPPORT SYSTEMS

- A. Multi-conduit surface or trapeze type support and pull or junction box supports:
- 1. Material requirements.
    - a) Galvanized steel: ASTM A123 or ASTM A153.
    - b) Stainless steel: AISI Type 316.
    - c) PVC coat galvanized steel: ASTM A123 or ASTM A153 and 20 mil PVC coating.
- B. Single conduit and outlet box support fasteners:
- 1. Material requirements:
    - a) Zinc plated steel
    - b) Stainless steel

- c) Steel protected with zinc phosphate and oil finish.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

#### **A. General:**

1. Install electrical raceways and fittings as shown in accordance with the manufacturer's written instructions, the applicable requirements of the NEC, and in accordance with recognized industry practices to ensure that products serve the intended function. Complete electrical raceway installation before starting the installation of wire and cable.

#### **B. Conduit Size:**

1. Minimum conduit size for power wiring shall be  $\frac{3}{4}$ ". Minimum conduit size for control wiring shall be  $\frac{3}{4}$ ". Minimum conduit size for voice/data wiring shall be 1".

#### **C. Rigid Steel and Intermediate Metal Conduit:**

1. Use rigid steel or intermediate metal conduit to run all electrical raceway systems where exposed to weather; in damp or wet locations; where subject to physical damage; and where cast in concrete walls or floors slabs which have waterproof membranes and where cast in masonry walls. Use rigid steel or IMC conduit for all exposed feeders. IMC conduit shall not be used in sizes larger than 4". Use threaded type couplings and fittings. Split type couplings and fittings are not acceptable. The interior of all buildings shall be considered a damp or wet area.

#### **D. Rigid Nonmetallic:**

1. Use PVC conduit directly buried in earth, concrete encased, cast in concrete slabs, and where subject to corrosive environment. PVC may be used for all raceways on the interior of the building, which do not contain 480 volt conductors or motor feeders. Use Schedule 40 where direct buried and Schedule 80 where exposed, with size adjusted to have same fill area as if Schedule 40 were used.

### **3.2 INTERIOR CONDUIT SYSTEM:**

#### **A. Ground all metallic conduit in accordance with the requirements of the latest edition of the NEC.**

#### **B. Install all conduit as a complete system without conductors, continuous from outlet to outlet and from fitting to fitting. Make up threaded joints of conduit carefully in such a manner as to ensure a tight joint. Field-cut threads shall be cold-galvanized after cutting. The entire conduit system shall be secured at all joints and boxes in such a manner that each system shall be electrically continuous throughout. Fasten the entire conduit system securely into position. A run of conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall not contain more than the equivalent of four quarter bends, including those bends located immediately at the outlet or fitting.**

#### **C. Ream all ends of conduit properly to remove rough edges. Whenever a rigid steel or IMC conduit enters a switchboard, panelboard, enclosure, or box it shall be securely fastened by the use of a locknut inside and outside and an approved insulating bushing shall be installed. Insulated grounding bushings shall be installed on all conduits without ground conductors and where required by NEC Article 250. Lay out and install all conduit systems as to avoid all other services or systems, the proximity of which may prove injurious to the conduit or the wires or conductors which the conduit confines.**

#### **D. Conceal conduit systems in finished areas. Concealed metallic conduits shall be run in a direct manner, basically parallel to, and at right angles with the lines of the building, and with as long a bend as possible. Conduit may be exposed in mechanical rooms and where**

otherwise shown or indicated. On exposed systems, run the conduit parallel or perpendicular to the structural features of the building and rigidly support with malleable iron conduit clamps at intervals as required by NEC, or on conduit racks, neatly racked and bent in a smooth radius at corners insofar as practicable. All bends shall be field-made using an approved bending machine designed for the purpose, or using standard ells having a radius not less than that required by the National Electrical Code, and with approved fittings or connectors. All bends shall be free from dents or flattening.

- E. All conduit shall be run without traps. Where traps are unavoidable, a junction or pull box shall be placed at the low point. Metallic conduit systems, which are exposed to the weather or water, shall be made watertight. As soon as conduit has been permanently installed in place, conduit shall be capped or plugged with standard accessories. All metallic conduit shall be swabbed after plaster and drywall is finished and dry.
- F. Support exposed raceway or grouped concealed raceways on galvanized channel using compatible galvanized fittings (bolt, beam clamps, and similar items) and galvanized threaded rod pendants to secure raceway to channel and channel to structure. Support single conduit runs using a properly sized galvanized conduit hanger with galvanized closure bolt/nut and threaded rod. Support-spacing shall not exceed 10' apart for all IMC conduit and rigid conduit 2" and smaller, and 15' apart for rigid conduit 2-1/2" and larger and within 3' from boxes and changes in direction. Support flexible conduit on maximum 4-1/2' centers and within one foot (1') of boxes. All raceway support system materials shall be galvanized and manufactured by Kindorf, Unistrut, Superstrut, Caddy, or Spring Steel Fasteners, Inc. Provide chrome or nickel-plated escutcheon plates on all conduit passing through walls and ceilings in finished areas.
- G. Make all joints and connections to ensure mechanical strength and electrical continuity. PVC conduit shall be joined, or have fittings attached, by using a fusing (solvent) compound recommended by and applied as instructed by, the conduit manufacturer.
- H. Run conduit to avoid proximity to heat producing equipment, piping and flues, keeping a minimum of 8" clear. Whenever possible, install horizontal raceway runs above water piping. Unless shown otherwise, do not install conduit horizontally in concrete slabs without written approval. All roof penetrations shall be made in adequate time to allow the roofer to make proper flashings.
- I. Carefully review architectural, structural, mechanical, plumbing, and electrical Drawings and place boxes and conduit to avoid conflicts with structural members or other general construction.
- J. Conduit larger than 3/4" shall not be embedded in structural slabs without prior written permission from the Engineer. Conduits embedded in structural slabs shall be installed in the middle of the slab below the top and above the bottom reinforcing steel. Maintain a minimum concrete coverage of one (1") except where penetration is made.
- K. Furnish sleeves for timely placing in construction for all conduit passing through concrete walls, partitions, beams, floors, and roofs while same are under construction.
- L. All conduit passing through the housing on connected equipment, shall pass through a cleanly cut hole protected with an approved grommet.
- M. Metallic conduit installed below grade shall have its entire length painted with two coats of protective finish unless encased in concrete. Each coat shall consist of 5 mils of PPG "Coat Cat Epoxy Coating" applied in accordance with the manufacturer's recommendations. The entire length of metallic conduit, including fittings, shall be protected to a point 6" above finished grade (or concrete slab).
- N. Install expansion fittings in all conduit as follows:
  - 1. All conduits crossing building expansion joints; unless some other form of thermal expansion compensation is approved in writing by the Engineer,

2. All conduit straight runs in excess of 200', and 400' centers in all longer conduit runs,
3. Conduit entering environmental rooms,
4. Locations subject to thermal expansion and as required by NEC.
5. Unless expansion fitting has an integral bonding braid, an external braid approved for the purpose shall be installed around the fitting.

**3.3 EXTERIOR CONDUIT SYSTEMS**

- A. Exterior conduit systems shall meet all of the general installation requirements for interior conduit systems.
- B. All exterior conduit systems shall be completely watertight. All hangers, fasteners, and supports used with exterior conduit systems shall be stainless steel.
- C. Install underground conduits with sealing glands equal to OZ Type "FSK" or approved equal exterior to entrance and OZ Type "CSB" or approved equal interior to entrance at points where conduits enter the building, to prevent water seepage.
- D. Install conduits outside the building lines a minimum of 30" below grade, unless noted otherwise on the Drawing. Maintain 12" of earth or 2" of concrete separation between electrical conduits and other services or utilities below grade. Maintain 10'0" separation between parallel underground power and voice/data conduits. Where power and voice/data conduits cross below grade, crossing shall be at right angles (90 degrees) with a minimum 2'0" vertical separation.

**3.4 EMPTY CONDUIT RACEWAY SYSTEMS**

- A. General: Empty conduit in which wire is to be installed by others shall have pull wires installed. The pull wire shall be No. 14 AWG zinc-coated steel, or plastic having not less than 200 pounds tensile strength. Not less than 12" of slack shall be left at each end of the pull wire.

**3.5 IDENTIFICATION**

- A. See Section 26 00 02 for applicable labeling requirements.
- B. Conduit Markers
  1. All conduits scheduled shall be identified at each end with a permanent tag. Conduits shall be labeled as identified on the Conduit and Wire Schedule. Attach tags to cables or conduit by using a nylon cable tie. Identify concealed conduits entering equipment, panelboards, or enclosures by attaching marker tag to cables as they exit the conduit. Embedded conduits and conduits routed underground shall be labeled also at all points of entry and exit including handholes and buildings, by attaching a marker tag to the exterior of the conduit.

**3.6 FIELD INSPECTION**

- A. Prior to backfilling and encasing conduits installed underground or covering conduits concealed in walls and ceilings, all raceways shall be inspected by the Engineer. Engineer shall be contacted a minimum of one week in advance for field inspection of concealed raceway. No raceway shall be concealed or backfilled until inspected by the Engineer.

**END OF SECTION**

## **SECTION 26 70 00 MOTORS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Material and installation requirements for:
  - 1. Motors

#### **1.2 DESCRIPTION OF WORK**

- A. This section covers motors which are supplied with and as part of connected equipment specified in other sections of this specification.
- B. Special provisions, requirements and/or revisions to this Specification and/or Bid Item(s) may be included on the Drawings or Details.

#### **1.3 RELATED SECTIONS**

- A. Related Sections include but are not necessarily limited to:
  - 1. Mechanical Equipment Specifications
  - 2. Section 26 00 00 – Electrical General Provisions
  - 3. Section 26 00 02 – Basic Materials and Methods
  - 4. Section 26 01 26 – Electrical Testing
  - 5. Section 26 05 19 – Wire and Cable
  - 6. Section 33 32 13 – Packaged Wastewater Lift Station

#### **1.4 STANDARDS AND REFERENCES**

- A. All materials and equipment specified herein shall within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- B. All materials and equipment specified herein shall conform with all applicable NEMA, ANSI and IEEE Standards
- C. All materials and equipment specified herein and their installation methods shall conform to the latest published version of the National Electrical Code, NEC.

#### **1.5 SUBMITTALS**

- A. Shop Drawings
  - 1. See Section 26 00 00.
  - 2. Drawings and Data: Catalog information and complete name-plate and efficiency information.
  - 3. Motor wiring and connection diagrams for all provided external connections including power, overtemp contacts, space heaters, moisture sensors, etc.
  - 4. Physical drawing showing electrical connection.
  - 5. Refer to individual equipment specification requirements.
  - 6. For motors provided with cords, provide complete information on the cord including:
    - a) Length, number and size of conductors, overall diameter, materials, ratings, etc.

7. For motors with special requirements for protection such as overtemp, moisture, overtorque, etc. from electrical controls or components, submit detailed information on equipment, installation, and control wiring requirements.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. See Section 26 00 00.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. Unless specifically excepted, all motors shall be "premium efficiency" type which meet the minimum efficiencies required by the current Energy Policy Act. Normal efficiency motors shall not be supplied. In addition, all motors shall have a minimum power factor rating of .85 at full load, motors rated at a lower power factor shall not be supplied.
- B. Provide motors in accordance with standard NEMA type classifications as specified. The use of industry standard sub classifications such as "Mill and Chemical" motors and similar "standard" heavy-duty designs are encouraged where they meet or exceed the specified minimum requirements.
- C. All Motors shall be suitable both electrically and mechanically to drive the connected equipment under any and all modes of operation. The speed, horsepower, torque, base, bearing, shaft, insulation, and enclosure shall be closely coordinated with equipment requirements specified herein and in other portions of this specification so as to provide a satisfactory, efficient drive without overloading, overheating, abnormal noise or vibration.
- D. All Motors shall be designed and built for long, trouble-free life in industrial service and shall be capable of operating successfully under the following application conditions:
  1. 40° C maximum ambient temperature to -20° C minimum ambient temperature,
  2. 3,300 ft. maximum altitude,
  3. Voltage variations to plus or minus 10% of nameplate rating,
  4. Frequency variations to plus or minus 5% of nameplate rating,
  5. .85 minimum full load power factor.
- E. All motors shall be rated for full voltage starting, NEMA Design B, normal torque, normal starting current, unless otherwise required by the driven equipment or specified.
- F. All motors shall be suitable for the environment in which they are to be installed.

### **2.2 ENCLOSURES**

- A. Explosion proof non-ventilated - (XPNV).

### **2.3 MOTOR ACCESSORIES**

- A. Motor Leads: Provide motor leads compatible with motor insulation system, permanently identified.
- B. Eyebolts: Provide drilling and tapping for eyebolts on all motors weighing more than 83 pounds.
- C. Nameplates: Provide two engraved stainless steel stamped metal nameplates (one for the motor and one for mounting in the motor starter enclosure), with the information required by NEMA-MG1 and the following additional information:
  1. Maximum ambient temperature for which motor is rated,
  2. Class of insulation,

3. Service factor,
  4. Bearing part number,
  5. Motor connection diagram if more than three leads,
  6. Power rating in kW if driven equipment ratings are given in metric units,
- D. Enclosed Motors: Provide drain plugs for non-explosion proof motors and drain and breather for explosion proof motors.
- E. Finish: Provide a prime and final finish of the manufacturer's standard colors.

## **2.4 INSULATION CLASS**

- A. Provide NEMA Class B insulation with additional nonhygroscopic moisture protection which will maintain a minimum resistance of 1.0 megohms after 168 hours of exposure at 100% humidity.
- B. Class F insulation with additional nonhygroscopic moisture protection as specified above may be utilized at the Contractor's option, however, the temperature rise as measured by resistance when operating at rated service factor and load shall conform to the limiting observable temperatures in NEMA-MGI, for class B insulation.
- C. Class A insulating materials shall not be utilized.

## **2.5 SERVICE FACTOR**

- A. The rated nameplate horsepower of the motor, when operating at a service factor of 1.0, shall be equal to or greater than the horsepower required to drive the connected equipment under any and all modes of operation.
- B. Provide motors with a 1.15 service factor.

## **2.6 SUBMERSIBLE MOTORS**

- A. Definite purpose submersible motors shall conform to the following:
1. Motor shall be designed for service in a liquid temperature of 25° C. Set controls to permit operation only when fully submerged unless specifically rated for non submerged duty.
  2. Motor shall have two mechanical seals; the lower one outside the motor and protecting the upper one which shall be in an oil filled chamber.
  3. Provide embedded thermostats for thermal alarm or motor cut-out.
  4. Provide water detector probes in seal oil chamber.
  5. Provide one or more multiconductor cables of approved construction and suitable length to extend from the motor to the indicated receptacle or junction box. Provide strain relief for the cable.
  6. Separate cables shall be provided for power and alarm conductors.
  7. Provide control wiring connection diagram and all necessary components, relays, etc. for the required and proper control and shutdown of the motor. Provide descriptive information to the Engineer and/or System Integrator on the control of the equipment.

## **2.7 POWER RATINGS**

- A. Motor horsepower, if indicated in the detailed equipment specifications, are minimum size acceptable.
- B. Ratings indicated on the electrical drawings are for guidance only and do not limit the equipment size.
- C. Frame/hp relationships shall conform to the latest NEMA standards for "T" or "U" frames, and all dimensions shall meet NEMA standards.

**2.8 SYNCHRONOUS SPEED**

- A. In general, the motor speed indicated is the rated synchronous speed. Provide motor rated full-load speeds which are compatible with the specified performance of the driven equipment.

**2.9 STANDARD RATED VOLTAGE PHASE AND FREQUENCY**

- A. Provide motors nameplate-rated for 60 hertz power supply as follows unless otherwise specified or shown on the drawings:
  - 1. Motors less than 1/6 hp, single-phase, 115V.
  - 2. Motors 1/6 hp to 1/2 hp, single-phase, 115/230V.
  - 3. Motors 1/2 hp through 100 hp, three-phase 230/460V.
  - 4. Multi-speed and part winding start motors may have single voltage rating if manufacturer's standard.
- B. Conform to the specified service conditions and the equipment specifications without reduction in the service factor.

**2.10 DUTY CYCLE**

- A. Provide motors rated for continuous duty unless otherwise specified.

**2.11 EFFICIENCY**

- A. Efficiency shall be determined by testing production motors with a dynamometer at rated output, voltage and frequency in accordance with IEEE Specification 112A, Paragraph B.

**2.12 SHOP TESTS**

- A. Each polyphase motor shall be given a routine test to determine that it is free from electrical or mechanical defects and provide assurance that it meets the specifications. The routine test shall conform to applicable NEMA and IEEE Standards latest revision.
- B. Copies of the test report will not be required unless actual operation and installation suggest the motors' performance should be verified, in which case certified copies of the test report shall be submitted upon the Engineer's request.

**PART 3 EXECUTION****3.1 INSTALLATION**

- A. Connect motors to power supply and controllers.
- B. Verify correct rotation of equipment.
- C. Connect motor leads with a splice kit specifically designed for motor lead connection.
  - 1. Refer to Section 26 05 19 – Wire and Cable.

**3.2 INSTALLATION CHECK**

- A. Provide services of an experienced, competent, and authorized representative of manufacturer to visit site of work to inspect, check, adjust if necessary, and approve equipment installation for motors.
- B. Assure that equipment manufacturer's representative is present when equipment is placed in operation.

- C. Verify that equipment representative revisits job site as often as necessary until all trouble is corrected and equipment installation and operation are satisfactory, at discretion of Engineer.
- D. Verify that motor overcurrent protection is in accordance with the NEC.
- E. Verify the motor protection and control is in accordance with the equipment manufacturer's requirements.

**3.3 TESTS**

- A. The Contractor shall simulate all motor alarm and shutdown conditions to test that the motor control is operating correctly. These tests shall be witnessed and verified by the Engineer.
- B. The Contractor shall perform voltage, current and resistance tests as required to complete the Motor Test Report.
  - 1. Refer to Section 26 01 26 – Testing.
  - 2. The Contractor shall inform the Engineer a minimum of 3 days in advance of testing and shall only perform tests with the Engineer or Owner's representative present.
- C. If the test results indicate corrective measures are required, the Contractor shall undertake all such corrective measures until the electrical system is accepted by the Engineer. No additional compensation will be paid for corrective measures.

**END OF SECTION**

## **SECTION 26 90 25 CONTROL COMPONENTS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Material and installation requirements for:
  - 1. Float switches

#### **1.2 DESCRIPTION OF WORK**

- A. The control system shall include the control devices, sensors, interfacing devices, cabinets, enclosures and other components indicated and implied by the Plans and these Specifications, and to provide trouble-free operation with minimum maintenance.
- B. The Contractor shall supply all interfacing equipment, appurtenances and accessories and all such devices that may be required for proper interfacing as part of the control system.

#### **1.3 RELATED SECTIONS**

- A. Related Sections include but are not necessarily limited to:
  - 1. Section 26 00 00 – Electrical General Provisions

#### **1.4 STANDARDS AND REFERENCES**

- A. All materials and equipment specified herein shall within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- B. All materials and equipment specified herein shall conform with all applicable NEMA, ANSI and IEEE Standards
- C. All materials and equipment specified herein and their installation methods shall conform to the latest published version of the National Electrical Code, NEC.

#### **1.5 SUBMITTALS**

- A. Shop Drawings
  - 1. See Section 26 00 00.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. See Section 26 00 00.

#### **1.7 COORDINATION WITH MOTOR CONTROLS AND OTHER EQUIPMENT**

- A. The Contractor shall be solely and completely responsible for coordination and integration of control system with the motor control and other related equipment. The Contractor shall communicate directly with the Manufacturer(s) and supplier(s) of all related control equipment to determine all intended details of the equipment, which may influence or affect the control system. The Contractor shall determine all requirements for and shall cause integration of the control system and all other control equipment into a unified operating system. The Contractor shall define all requirements for all interfacing equipment and shall supply all appurtenances, accessories and all such devices, which may be required for proper interfacing as part of the control system.

**PART 2 PRODUCTS**

**2.1 FLOAT TYPE LEVEL SWITCHES**

- A. Float-type level switches shall be mercury free type with a separate, teflon coated, adjustable weight on the cord. Switches shall have permanently encapsulated N.O. (or N.C.) rated at 12A at 115V. Cable shall be 3 #16 AWG, stranded, with PVC jacket, integral to float with sufficient length to meet requirements shown on the drawings. Float switches shall be Siemens 9G-EF or engineer approved equal.
- B. Provide stainless steel mounting hardware as recommended by the manufacturer to meet the requirements for the installation.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Installation shall include all elements and components of control system and all conduit and interconnecting wiring between all elements, components, sensors and valve operators. All wiring between cabinets, sensors, pumps and equipment shall be multiple color coded for ease of servicing. All terminations shall be made with solderless pressure connectors.

**3.2 CALIBRATION AND START-UP**

- A. All components of the control system shall be calibrated by the Contractor after completion of installation. Each component shall be adjusted to be within the Manufacturer's required range and for the specific application.
- B. Components that cannot be properly calibrated or that are found to exceed the Manufacturer's specified range or accuracy shall be removed and replaced at no additional cost to the Owner.

**3.3 SYSTEM MAINTENANCE**

- A. The Contractor shall be solely and completely responsible for all maintenance of the system from time of start-up to the date of acceptance, by formal action of the Owner, of all work under the contract. The Contractor shall correct all deficiencies and defects and make any and all repairs, replacements, modifications, and adjustments as malfunctions or failures occur. The Contractor shall perform all such work required or considered to be required by the Owner to cause and maintain proper operation of the system and to properly maintain the system.
- B. The Contractor shall anticipate that the Owner may delay acceptance of all work under the contract if, in the judgment of the Owner, malfunctions or failures in operation of the control system repeatedly occur after start-up. The Contractor shall not be entitled to an extension of time or to any claim for damages because of hindrances, delays or complications caused by or resulting from delay by the Owner in accepting the work because of malfunctions or failures in operation of the control system.

**3.4 OPERATION AND MAINTENANCE TRAINING**

- A. See Section 26 00 00.

**END OF SECTION**

## **PART 8**

### **CONTRACT DRAWINGS**

*(BOUND SEPARATELY)*